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THE GAS JOURNAL

AUGUST 19, 1931

A Glance at the Contents—

Automatic Control of Coke Oven Plants.

L. Litinsky describes methods for the automatic control of the ammonia and benzole plant in coke ovens. [p. 422.]

Education for Salesmanship.

We conclude our extracts from the Final Report of the Government Committee on Education for Salesmanship, of which Sir Francis Goodenough, C.B.E., was Chairman. [p. 426.]

Gas Driven Motor Vehicles.

In connection with the series of fuel tests at the French Colonial Exhibition, demonstrations of the potentialities of gas driven vehicles were given over a selected route of approximately 50 miles. [p. 422.]

New Liquid Purification Process at Hamburg.

Our "Continental Notes" to-day contain a translation from "Das Gas- und Wasserfach," 1931, 74, 653-657 (July 11), in which H. Müller describes the process of liquid purification invented by Fischer and developed by Dr. Brandt, the Chief Chemist of the Hamburg Gas-Works. [p. 422.]

Repair and Cleaning of Tar Stills.

In a paper, extracts from which are reproduced to-day, at the Chemical Session of the National "Safety First" Week, Leeds, Mr. H. C. Dungey, of Yorkshire Tar Distillers, comments on the repair and cleaning of tar stills, the carrying out of which operation has presented various problems to the tar industry from the earliest days. [p. 425.]

Public Works, Roads, and Transport Exhibition.

The Sixth Public Works, Roads, and Transport Congress and Exhibition will be held at the Royal Agricultural Hall, London, from Nov. 16 to 21, 1931. On Tuesday, Nov. 17, two papers will be presented on Gas Supply. This Session is held under the auspices of the Institution of Gas Engineers, and the chair will be occupied by the President of the Institution, Mr. J. Herbert Canning, O.B.E., F.C.S., a Vice-President of the Congress and Exhibition. [p. 419.]

Soil Corrosion Studies in America.

As a contribution to the Distribution Conference of the A.G.A. (April, 1931), Mr. K. H. Logan, of the Bureau of Standards, Washington, gives an interesting account of soil corrosion studies carried out by the United States Bureau of Standards, extracts from which we publish in this issue. The financial and moral support and encouragement which the Bureau of Standards has received for its study of soil corrosion has resulted in a growth of the work until at this time eight Bureau men and three research associates are engaged on problems relating to pipeline corrosion and protection. [p. 435.]

Oil From Coal.

We reprint a series of letters which are bound to be of value to anyone who wishes to get a picture of the hydrogenation situation as it exists at present, and to learn of current opinions on the hydrogenation of coal and coal tar. [p. 424.]

Assistant Engineer and Manager Required at Tipton.

The Tipton Urban District Council, as will be seen from our advertisement columns, are inviting applications for the position of Assistant Engineer and Manager for their gas-works. The commencing salary offered is £200 per annum, rising by annual increments of £25 to a maximum of £300 per annum. [p. 442.]

Monkeys in the Showroom Window.

Our Service Notes this week contain an amusing account of the adoption in America of the monkey as a showroom window salesman. The creature seems to be well-favoured by gas undertakings on the "other side," and what is more, he seems to be well adapted to any kind of gas appliance display from the fire to the refrigerator. [p. 421.]

Drying Coal Prior to Carbonization.

We publish notes on a test carried out by Mr. R. A. Mott, of the Department of Fuel Technology, Sheffield University, on the "Universal" coal dryer installed at the Barrow Collieries, Barnsley. This dryer, which is manufactured by the Brightside Foundry and Engineering Company, Ltd., of Sheffield, is of simple design, and Mr. Mott is of the opinion that it is likely to be of great use to the coking industry. [p. 423.]

Irish Association of Gas Managers.

Londonderry, whose history goes back to early times, and whose fame will last for as many years to come, was, as the home of the President, selected for the thirty-ninth annual general meeting of the Irish Association of Gas Managers. Derry, as the city is popularly called, is a place of industrial importance, but no undertaking there is more esteemed than the Gas Company, whose Engineer, Manager, and Secretary (Mr. George Walmsley) presided over the meeting. The business proceedings took place in the magnificent Guildhall. [p. 429.]

Tar Firing of Retorts.

Mr. W. E. Young, Manager and Secretary to the Cobh (Queenstown) Gas Company, describes the arrangements he has in force for heating a bed of horizontal retorts with tar. He does not tell us anything about the conditions of the coke market in Queenstown, or what prices his tar might fetch, but he makes the point that, for firing settings, 100 gallons of tar liberates for sale 1 ton of coke, and that whether it pays to use tar or coke is a matter which can be determined only in the light of local circumstances. [p. 431.]

EDITORIAL NOTES

Gas Progress in Ireland

THE comments of Mr. G. Walmsley on the position of the Gas Industry in Ireland are most encouraging. In a year of great difficulty the output of gas in 1930 increased by 2·6 p.ct., and the number of consumers served by no less than 5 p.ct. These figures compare with 2·5 p.ct. and 2·8 p.ct. for the whole of the British Isles. And during recent times naturally every effort has been made to justify the enormous capital expenditure on the Shannon hydro-electric scheme—a scheme which, to quote Mr. Walmsley, " was unhappily devised on too large a scale for such a sparsely populated country." Certainly the revenue from the existing lighting and power load is insufficient to provide the necessary revenue to justify the capital expenditure; and for this reason the Electricity Supply Board is going " all out " for the heating load. It is here, however, that electricity is faced with the fact that a unit of current contains 3412 B.Th.U., and only 3412 B.Th.U., and that on a heat unit basis current is far more costly than gas, taking into account any difference in utilization efficiency. The other point to bear in mind is that the costs of distributing electricity have a much larger bearing on the price at which it can be sold than have the costs of generation. The electricity industry is working hard to gain heating customers; so is our own industry, and it is significant of what the Irish public think about gas that there should have been such a healthy increase in the number of gas consumers last year.

In his Presidential Address to the Irish Association of Gas Managers, which was published in the " JOURNAL " last week, Mr. Walmsley speaks of electrical developments in Northern Ireland. The experts of the Government have turned down hydro-electric generation as impracticable, but they are aiming, of course, at supplying the rural areas with electricity; and the President wonders what will happen to such electricity concerns as those at Belfast and Londonderry if they become burdened with the high capital costs of distribution necessary to achieve this aim. We cannot do better than repeat what the Belfast Corporation Electrical Engineer said recently: " One must concede that the financial control of electricity supply undertakings has been up to the present time very wise and safe, and we must not, in our enthusiasm for development, ignore the advice of their financial officials in connection with our projects. Northern Ireland as a whole is not a rich field for electrical development. It is sparsely populated. Rural electrification will be difficult on account of the comparative smallness of the farms, and the linen mills are difficult prospects. . . ." While all these schemes are in the melting-pot, it is up to the Gas Industry to make certain that its consumers are being well served; and we endorse Mr. Walmsley's advice that capital should be spent wisely in the opening of showrooms, launching of hire-purchase and maintenance schemes, and so on.

Mr. Walmsley's advice on capital expenditure is to attend to the " front line " (the district) as well as the " base " (the works). And in this connection he suggests that ideas of what is adequate holder capacity need revision in view of the changes which have taken place in the 24-hourly load of the Industry. To support his argument, he mentions that, although the annual output of the Londonderry Undertaking increased from 118 million c.ft. in 1922 to 176 millions in 1930, the storage problem was more acute ten years ago than it is to-day. " With the prospects of increased cooking and heating loads, and particularly a 24-hour gas-heated water and refrigerator load, the capital expenditure per 1000 c.ft of gas sold as represented by holders will generally tend to decrease." This is true, but once the heating load has passed a certain point, the storage problem is by no means lessened; this was demonstrated clearly enough during the early months of 1929. Among other interesting matters dealt with by the President is the life of the Glover-West vertical retorts which were installed in 1924. " The original twelve retorts," he observes, " are still making gas, each retort having already had a working life of over 2200 days, and their present condition warrants their continuing for some years yet before being rebuilt. Carbonizing both Yorkshire and Scotch coals at an average temperature in the combustion chambers of 2300° Fahr., the life of these retorts is, I think, well above the average." During the seven years the maintenance costs averaged only £49 per annum; and it is probable that considerably more than 100,000 tons of coal will be carbonized by the twelve retorts before they are re-set. Mr. Walmsley points to the need for all interested in the welfare of the Irish Gas Industry to urge the use of " Irish Tar for Irish Roads," and believes that all executive bodies of the Gas Industry ought to consider the advisability of consolidating the various organizations under one head, as is done in America.

The only paper at the Irish Meeting was by Mr. W. E. Young, Manager and Secretary to the Cobh (Queenstown) Gas Company, who describes the arrangements he has in force for heating a bed of horizontal retorts with tar. He does not tell us anything about the conditions of the coke market in Queenstown, or what prices his tar might fetch, but he makes the point that, for firing settings, 100 gallons of tar liberates for sale 1 ton of coke, and that whether it pays to use tar or coke is a matter which can be determined only in the light of local circumstances. His account would have been rendered more useful had he put forward a few figures of the prices he can get for his tar and coke and some information as to the local demand for each. His contribution will be of practical value, for he describes very clearly how he injects the tar without difficulty, how simple the operation of tar firing is, and how he lights-up the setting. He gives the tar consumption per 24 hours, but this figure is of little use without reference to the throughput of the retorts.

Oil from Coal

AT the present time a great deal of interest is being shown in the hydrogenation of coal and coal tar, and there is no doubt that rapid strides have been made in the technical development of the process during recent months in this country. In the " JOURNAL " for July 29 we published an extensive report of the discussion on fuel subjects at the Jubilee Meeting of the Society of Chemical Industry, on which occasion Mr. K. Gordon (Synthetic Ammonia and Nitrates, Billingham-on-Tees) gave much new information concerning the results of work which has been carried out by his Company on the hydrogenation of both coal and oil. Whether or not this set the ball rolling, the information was followed by much correspondence in the columns of " The Times " and by many articles in the Technical Press. The subject is what is termed a live one, and in view of its importance to the nation and the fuel industries, including all methods of carbonizing coal, we reprint on later pages to-day a series of letters which are bound to be of value to anyone who wishes to get a picture of the situation as it exists at present, and to learn of current opinions on the hydrogenation of coal and coal tar.

Some good purpose may be served if we summarize the pros and cons of the published arguments and statements on hydrogenation to which we refer. The first letter was published in " The Times " on July 31, when Prof. F. G. Donnan, of London University, having called

attention to Great Britain's annual consumption of imported oils—a matter of 9 million tons—maintains that no enterprise is more worthy of Government encouragement and help than the hydrogenation of coal. He states that for several years Germany has been producing, on a commercial scale, 100,000 tons of petrol annually " by the hydrogenation of brown coal; " and he mentions the work of Imperial Chemical Industries, Ltd., in the 20-ton per day plant at Billingham. This investigation, he says, has demonstrated the commercial possibility of manufacturing high-grade petrol and other oils from British coals, and has shown that petrol of a quality equal, if not superior, to the finest natural motor spirit can be produced at a cost of about 7d. per gallon. He then envisages the position if a plant capable of treating 1000 tons of coal a day were brought into operation. Such a plant would " require 850,000 tons of coal per annum. It has been calculated by experts that a plant of this character would give permanent employment to 5000 men, of whom 3000 would be miners. . . ." " I am convinced," Prof. Donnan observes, " that the security and future prosperity of this country urgently demand the erection and operation of such a plant, and that we possess sufficient knowledge and experience to justify the project." As to low-temperature carbonization, he is of opinion that it does not offer a solution to the problem of oil production in Great Britain, as does the direct hydrogenation of coal.

This letter was followed up the next day by a communication from Commander Colin Buist, who is Hon. Secretary to the Low-Temperature Coal Distillers' Association. In this he makes two points: First, that Germany has abandoned the direct hydrogenation of raw coal, and is working on the crude oils produced from brown coal; secondly, that at the present time the Government is assisting financially in quite a large way experiments on the hydrogenation of tar oils produced by carbonizing coal. He states that during the last two months most important results on the hydrogenation of tar oils have been achieved at the Fuel Research Station at East Greenwich, and he characterizes hydrogenation as " the principal ally of carbonization." Then, on Aug. 5, Prof. J. S. S. Brame, of the Royal Naval College, also emphasized that in Germany to-day hydrogenation is being applied almost exclusively to the tars obtained by low-temperature carbonization; and he asks Prof. Donnan whether he has any idea of the capital costs of a direct hydrogenation plant capable of treating 1000 tons a day, because no information has been made public of the capital costs, life, and depreciation of hydrogenation plants in relation to the daily throughput of material, though " they are unquestionably very high." He is also much exercised concerning the cost of hydrogen for the process. He suggests that it is unlikely that a cost less than 1s. per 1000 c.ft. can be assumed, and observes that, on this basis, as 10 c.ft. of hydrogen is required per pound of coal, the hydrogen cost would be over 22s. per ton of coal. And he asks whether the figure of 7d. a gallon for the petrol produced is inclusive of charges on capital, depreciation, &c., or is merely a production cost.

Finally, there comes the statement of Sir Harry McGowan, Chairman of I.C.I.: " The manufacture of hydrogen is a subject on which we have unique and extensive knowledge; neither the quantity required nor the price at which it can be produced presents any obstacle to the successful development of the hydrogenation process on an economic scale. I am quite satisfied that it is now practicable to build in this country a plant for the production of petrol from bituminous coal. A plant to hydrogenate 1000 tons of clean, dry coal per day could produce No. 1 motor spirit and sell it at present standard retail prices with a small profit, after allowing for all costs of raw material, manufacture, repairs, obsolescence, and distribution. It is not contended, however, that such a profit as the above would attract capital. It is mentioned as an indication of the fact that the hydrogenation process has already reached a stage at which only a very slight rise in the price of petrol is required to render it a self-supporting commercial proposition."

Our readers will, we think, agree with us that the present position of hydrogenation of coal and coal tar is not without fascination.

Correspondence

Peter and his Pals

DEAR MR. EDITOR,—

I have just turned to the Stock and Share List in the last issue of the " JOURNAL " to seek an investment for a friend, but the first words that catch my eye are " Peter—with one Exception; " and feeling sure it was intended *I* should read it, I have done so. Now for the moment " Stocks and Shares " must wait, while I draw a cheque in aid of Peter and his Pals, for I am convinced it will be a safe and good investment yielding substantial dividends. I already have the privilege of receiving dividends from other more or less similar investments, which afford me such pleasure and satisfaction as make me wish it were my vocation to be perpetually adding to their number.

I should like to add how much I thank you for doing your part by inserting in your pages the little note in reference to Peter. You are indeed breaking fresh ground which I hope will produce a bumper crop and afford you a goodly measure of the pleasure and satisfaction I have realized.

Yours sincerely,
" GASMAN."

Aug. 11, 1931.

DEAR SIR,—

On behalf of the Chairman, I write to acknowledge and thank you for your letter of yesterday enclosing a donation from " Gasman."

As the amount has been sent anonymously it is not possible for me to write " Gasman " personally and thank him, but I am hopeful that perhaps you will find a little space in your next issue to express our deep gratitude, not only for his very practical sympathy, but also for the kind thought which prompted the sending of the letter accompanying his donation.

I know that " Gasman " will be pleased to learn that, as a result of the generous allowance of free space you have given to " Peter " during the past two years, we have received a considerable number of very welcome contributions.

Yours faithfully,
H. B. REYNELL,
Organizing Secretary.

School for the Blind,
Swiss Cottage, London, N.W. 3,
Aug. 13, 1931.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 10.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Rothesay.

Sept. 16.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of General Committee at 28, Grosvenor Gardens, S.W. 1.

Sept. 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council Meeting in the afternoon.

Sept. 17.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Meeting at Porthcawl.

Sept. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Exeter.

Oct. 9.—NORTH OF ENGLAND ASSOCIATION.

Oct. 14.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn Meeting in London.

Oct. 27-28.—INSTITUTION OF GAS ENGINEERS.—Autumnal Research Meeting.

PERSONAL

The wedding took place at St. Stephen's Church, South Dulwich, on Friday, Aug. 14, of Mr. GRAHAM A. MOGFORD, Assoc.M.Inst.Gas E., only son of Mr. J. A. Mogford, M.Inst.Gas E., of Llanishen, Glam., and Miss Ursula Butterfield, second daughter of Mr. W. J. A. Butterfield, of Ebor House, Sydenham, one of the Gas Referees. The officiating clergy were the Rev. W. F. James, Vicar of St. Stephen's, and the Rev. Ivor Davies, brother-in-law of the bridegroom. After the ceremony a lunch at the Park Lane Hotel, Piccadily, W., was given by the bride's parents to relatives and a few close friends. On returning from the honeymoon Mr. Graham A. Mogford sails for Brazil to take up an appointment with the Rio de Janeiro Light and Power Company, and Mrs. Mogford will join him there early in the New Year.

On July 6 last, the Kernot Memorial Medal for the year 1929, in the gift of the University of Melbourne, was presented to Mr. JOSEPH NEWELL REESON, M.Inst.C.E., M.Inst.Gas E. This medal is presented for the outstanding achievements in engineering in Australia each year, but the details of the award were not determined, by the special assessors, until recently, and the appointment, consequently, had been delayed. Mr. Reeson was Engineer-in-Chief to the Metropolitan Gas Company of Melbourne, and he introduced electric arc welding with the construction of large civil engineering structures. His great engineering achievement is that he pioneered the development of the science and art of electric arc welding in Australia. His earliest achievement, in this respect, was the all-welded South Melbourne gasholder, and this has been followed by many other applications to civil and mechanical engineering, in all totalling some 12,000 tons in Melbourne.

OBITUARY

HARRY WIMHURST.

For many years one of the most popular figures in Sleaford, Mr. Harry Wimhurst, the late Manager of the Sleaford Gas-Works, died in his 81st year at a nursing home near Bury St. Edmunds, on Aug. 3, after having suffered from poor health for the last five or six years.

Mr. Wimhurst was born at Chichester in 1850, and at an early age commenced his career at the gas-works there. In his early twenties, he went to Sleaford to work as an assistant to the Sleaford Gas Company's Manager, Mr. T. Boutelle. In 1875 he left Sleaford to take up the appointment as Manager of the Andover Gas Company, but four years later, on the death of Mr. Boutelle, he returned to Sleaford as Manager of the Sleaford Works, which position he held until he retired in 1920, after having served the Sleaford Company for 41 years.

During Mr. Wimhurst's management, the Sleaford Gas Company made steady and consistent advance, and the works were entirely reconstructed during the three years 1894-96.

Deceased was one of the founders of the Eastern Counties Gas Managers' Association, and was its first Secretary, and later on he was elected President of the Association. He was also a member of the Institution of Gas Engineers from 1875 until his retirement in 1920.

Mr. Wimhurst's long service as Engineer and Manager was rewarded by a seat on the Sleaford Gas Company's Board of Directors, which he occupied until failing health in 1929 forced him to resign.

THE NEWS OF THE WEEK

The Montevideo Gas and Dry Dock Company, Ltd., notify that warrants for the half-year's interest due Sept. 1 on the 6 p.ct. redeemable mortgage debenture stock will be posted on Aug. 31.

South Shields Gas Company.—Dividend warrants for the half-year ended June 30, 1931, as follows, and payable on Aug. 15, were posted on Aug. 14: Consolidated stock, 4¼ p.ct., less income-tax; new stock, 4¼ p.ct., less income-tax; and ordinary stock, 2⅞ p.ct., less income-tax.

The Regulations and Syllabuses for the examinations in chemical, metallurgical, and other allied subjects for the session 1931-32 have been published by the Department of Technology of the City and Guilds of London Institute, 31, Brechin Place, South Kensington, S.W. 7—price 1s., postage 2d.

Although no Fast Times were Recorded at the annual athletic sports of the Plymouth and Stonehouse Gas Company, held in the presence of a considerable gathering of spectators at Dunstan Park, Plymstock, on Saturday, Aug. 8, every event was keenly contested and some of the finishes were very close.

The Sheffield Corporation Health Committee have considered a letter from the Association of Statutory Inspectors of Gas Meters, inviting the authority to support the periodical re-verification of gas meters and statutory control of electric meters. The Committee recommends the City Council to support the resolution.

To Comply with the Provisions of the Wolverhampton Gas Order, 1930, whereby the amount standing to the credit of the profit and loss account at the end of any year is limited, the Directors of the Wolverhampton Gas Company have decided to make a reduction of 2d. per 1000 c.ft. in the price of gas for the ensuing September and December quarters.

In Their Report for the Year Ended June 30, the Directors of Montrose Gas Company state that the quantity of gas manufactured during the year amounted to 80,992,000 c.ft., being an increase on the previous year of 2,760,000 c.ft. The accounts show a profit of £5080, which, with £1209 brought forward, left £6289 for distribution. The reserve fund has been increased by £1000 to £13,500, and a 10 p.ct. distribution to shareholders absorbs £4000, leaving £1289 to be carried forward, subject to the Directors' remuneration.

A Resolution was Submitted at the Leeds Corporation Finance Committee from the Gas Committee requesting the Committee to consider the adoption of the use of gas, in lieu of oil, in connection with the system of supplying heat to the new civic buildings in Calverley Street, and representatives of the Gas Committee attended with respect thereto. A report on the subject was obtained from Mr. A. H. Barker, M.Inst.C.E., Consulting Engineer, and the Committee decided that gas-fired equipment be adopted for the heating of the buildings.

Remarkable Examples of Ingenuity and Skill will be revealed in this year's competition for the Model-Making Championship of Great Britain. In addition to some beautifully made models of locomotives, marine engines, and historic ships, there will be many examples of the clever use of very simple materials. The entries will all be shown at the "Model Engineer" Exhibition at the Royal Horticultural Hall from Sept. 3 to Sept. 12.

The Institution of Heating and Ventilating Engineers are appealing on behalf of their Research Committee, which was resuscitated last October for the purpose of organizing a fund to assist the Government Department of Scientific and Industrial Research in its projected research on heating and ventilation at the Building Research Station, Watford, for funds to proceed with the building and equipment of the projected experimental "controlled weather" house.

A **New Company** with the title of the Société Mulhousienne du Gaz is being formed to take over the gasworks and concession in Mulhouse, France, as from May 1, 1933. The new concern will have a capital of 15 million francs, or approximately £120,000 in £8 shares, of which 51 p.ct. will be held by the municipal authorities of Mulhouse and 49 p.ct. by the existing Company, which latter is also to receive a cash payment of £87,200 to be raised by the issue of debentures by the new concern.

A Gross Profit for the Year amounting to £3214, which, with £1515 brought forward from last year, gives a total of £4729 available, is shown by the annual report of the Morpeth Gas Light Company, Ltd. The Directors recommend that this be dealt with as follows: In writing off for depreciation on meters and cookers, £519; in placing to reserve for special renewals of plant, &c., £250; in placing to general reserve account, £100; income-tax, £490; in paying 6 p.ct. for the year on preference shares, less income-tax (of this, an interim dividend amounting to £325, being at the rate of 3 p.ct., *less* tax, was paid in February last); in paying 7 p.ct., free of tax, for the year on ordinary shares (of this, an interim dividend amounting to £423, being at the rate of 2½ p.ct., free of tax, was paid in February last); which leaves to be carried forward a balance of undivided profits of £1532.

Public Works, Roads, and Transport Exhibition

The 6th Public Works, Roads, and Transport Congress and Exhibition will be held at the Royal Agricultural Hall, London, from Nov. 16 to 21, 1931, under the patronage of H.M. the King and the Presidency of the Minister of Health. A substantial proportion of the profits of previous exhibitions has been devoted to the Maybury Chair of Highway Engineering at the University of London, to which the Exhibition has already contributed £4500.

The Exhibition will comprise all descriptions of machinery, plant, and materials required in connection with the activities of public authorities, and approximately 90,000 sq. ft. of space have been applied for and allotted.

Two Papers on Gas Supply.

On Tuesday, Nov. 17, at 11 a.m., two papers will be presented on Gas Supply. This Session is held under the auspices of the Institution of Gas Engineers, and the chair will be occupied by the President of the Institution, Mr. J. Herbert Canning, O.B.E., F.C.S., a Vice-President of the Congress and Exhibition.

In addition to Gas Supply, Sessions are devoted to street lighting, sewerage and sewage disposal, water supply, the construction and maintenance of roads and bridges, and electricity supply.

A Papers Competition is held in connection with each biennial Congress and Exhibition, and twenty-four Papers were submitted for the 1931 Competition. The prizes awarded consisted of a Gold Medal and one hundred guineas, a Silver Medal and fifty guineas, a Bronze Medal and fifteen guineas, a Fourth Prize of ten guineas, and six awards of five guineas each for other Competition Papers accepted for presentation at the 6th Congress. A list of the suggested subjects in Gas Supply for Papers to be submitted before the end of 1932 for adjudication for the 1933 Competition may be obtained from the Secretary of the Institution. The Competition affords an excellent opportunity, frequently overlooked, for members and students of the Institution to present Papers of interest to the Gas Industry and of potential value to themselves.

Limited Number of Complimentary Tickets.

Delegates to the 6th Congress and Exhibition pay a fee of one guinea, which includes advance copies of all Papers to be read, entrance fee, Exhibition Catalogue, and the bound volume containing the official report of the Congress. The Secretary of the Institution is in a position to arrange for the complimentary admission of a limited number of members not registered as delegates, but tickets issued for this purpose do not comprise the issue of the publications aforementioned, although the holders may participate in the discussions.

The Ministry of Health has sanctioned the payment out of the rates of the reasonable expenses incurred in connection with the attendance of two delegates from any Highway or Sanitary Authority. The Railway Companies in Great Britain will issue return tickets to London at a single fare and one-third on presentation of the appropriate voucher.

The Institution of Gas Engineers is represented on the Permanent Organizing Committee of the Public Works, Roads, and Transport Congress and Exhibition by Mr. John Terrace, M.Inst.C.E., Past-President, and Mr. J. R. W. Alexander, M.A., LL.B., Secretary of the Institution of Gas Engineers, to whom requests for invitations and for further information concerning the Congress and Exhibition and the Papers Competition may conveniently be addressed by members of the Gas Industry. The address of the Institution is 28, Grosvenor Gardens, London, S.W. 1.

International Illumination Congress.

Banquet to Delegates from Abroad.

Readers are reminded that a Banquet has been arranged to take place on Wednesday, Sept. 2, in connection with the International Illumination Congress for the purpose of welcoming Delegates from abroad, and affords an opportunity for them to meet representatives of the Electrical and Gas Industries. Mr. C. C. Paterson, President of the International Commission on Illumination, will preside. It is hoped that all those associated with the lighting industry in Great Britain will make a special effort to attend and to bring with them as guests ladies or gentlemen who are in sympathy with the aims of the Congress.

The Banquet will be held in the Ball Room of the Dorchester Hotel, Park Lane, W., at 7.30 for 7.45 p.m., and will terminate at 10 p.m. promptly, in order to enable the Delegates to take part in a tour of inspection of the illuminated streets. Tickets will be 42s. each, inclusive of wines.

This is the first occasion on which a Banquet of this nature has been held in Great Britain, and we are sure that many of our readers will desire to be present. Applications for tickets should be addressed to Mr. J. S. Dow, 32, Victoria Street, London, S.W. 1, as soon as possible, as seats will be allocated in order of application.

West Country Amalgamation.

Highbridge, Burnham, and Weston-super-Mare.

Speaking at an Extraordinary General Meeting of shareholders of the Highbridge Gas Company, to consider the terms of the proposed amalgamation with Weston-super-Mare Gaslight Company (in which also the Burnham-on-Sea Gas Company is involved), Mr. Alfred E. Burnett (Chairman) said they had now arrived at an important stage in the history of the Company, which was founded in 1877, and of which his father had been the only Chairman up till the time of his death recently. The Weston Company had offered Highbridge generous terms. No one would suffer from the amalgamation, and the price of gas would be much reduced to consumers in Highbridge and Burnham. The Weston works were very up-to-date, and nothing but good could result from amalgamation. The tendency to-day was amalgamation in everything; competition was such that small concerns and people had no chance. In their own case, Weston would take over all their liabilities. He hoped that Highbridge, with its sister town of Burnham-on-Sea, would go through with the scheme. One Director would be appointed to represent Highbridge.

The meeting decided to accept the agreement made between the two Companies. Occupation will be provided for the Manager and workmen, and compensation will be paid to the Directors, Secretary, and Auditor.

Mr. S. Pill (a shareholder) said that, looking at last year's balance-sheet of the Highbridge Company, he felt they had done the right thing in accepting the agreement.

We understand that the Burnham-on-Sea Gas Company have since decided not to approve the scheme for the amalgamation of their undertaking with those of Weston-super-Mare and Highbridge. The Weston shareholders had approved the scheme, and, only during the week-end, the

THE NEWS—*continued.*

stockholders in the Highbridge concern came to a similar decision. Therefore, everything depended upon Burnham, and they, by 27 votes to 12, rejected the proposal.

The scheme was not hurriedly prepared; it has, indeed, necessitated months of exploration into the considerations involved. It was intended to rename the enlarged undertaking "The Weston-super-Mare and District Gas Company," and among other things, to give residents in the areas served by the Burnham and Highbridge Companies cheaper gas, but, apparently, an offer such as this did not have the desired effect as far as Burnham was concerned.

Floodlighting of the Accountants' Hall.

Incorporated Accountants' Hall on the Victoria Embankment is among the London buildings which will be floodlighted with daylight effect between 9 p.m. and midnight from Sept. 1 to 26, on the occasion of the International Illumination Congress.

The delegates to the Congress will visit the Hall on the mornings of Sept. 1 and 3, under the guidance of Mr. J. R. W. Alexander, Secretary of the Institution of Gas Engineers, who wrote the authoritative description of the history and architecture of Incorporated Accountants' Hall and was largely responsible for its restoration on its acquisition by the Society of Incorporated Accountants and Auditors in 1929.

Delegates from the United States of America will be particularly interested in this building, which is of considerable architectural merit and of remarkable craftsmanship, since it was built in 1895, at a cost of a quarter of a million pounds, by a citizen of New York, William Waldorf Astor, afterwards the first Viscount Astor, who used the building (then Astor House) as a London residence and as the Astor Estate Office until his death in 1919.

Engineering Abstracts.

Among publications of interest to all gas engineers are the "Engineering Abstracts from the current periodical literature of Engineering and Applied Science, published outside the United Kingdom," which are published by the Institution of Civil Engineers with the co-operation of other Engineering Societies in Great Britain and the Dominions. The Abstracts are prepared under the direction of the Publication Committee of the Council of the Institution of Civil Engineers with the assistance of an Advisory Panel, upon which the Institution of Gas Engineers is represented by Mr. Thomas Hardie.

Members of the Institution of Gas Engineers interested in these Abstracts, copies of which have been sent to members of the Council for some years past, should communicate with the Secretary at 28, Grosvenor Gardens, S.W. 1, where the past issues of the publications may be inspected. The Institution is in a position to arrange an advantageous rate of subscription for members desirous of receiving the abstracts regularly.

International Aluminium Competition.

It will be remembered that, at the beginning of this year, the European producers of aluminium organized a competition in which prizes were offered for suggestions designed to develop the use of aluminium and its alloys.

The Committee of judges have now finished the examination of the entries, and the following prizes have been awarded:

1. A prize of 25,000 French francs, awarded to Mr. Constantin Szmukler, 1, Rue Chaper, Grenoble (Isere), France, for a contribution on the use of aluminium in leather dressing and tanning.
2. A second prize of 25,000 francs has been divided equally between:

   Dr. H. Hampel, Elsasserstrasse 15, Pojeduch, b. Stettin, Germany, and

   Mr. de Haes, 3, Rue de Veeweyde, Bruxelles-Midi, Belgium, for two entries relating to the use of aluminium in radiators for central heating systems.

The special prize of 50,000 francs has not been awarded, the judges being of the opinion that no suggestion made was of sufficient importance and exceptional novelty to justify this award.

The competition aroused great interest in technical circles in the majority of countries. Approximately 1000 persons approached the International Aluminium Bureau for information on the competition, and eventually 291 entries were submitted to the judges. For the most part, these entries were highly meritorious and showed careful study of the properties of the light metals.

Baltimore's Gas Supply.

An issue of the "Baltimore Sunday Sun" last month devoted the whole of its front page to an article on the Gas Industry by Mr. Gerald Griffin, accompanied by appropriate photographs of the Spring Gardens plant of the Baltimore Consolidated Gas, Electric Light, and Power Company.

Of all the public utilities, stated the author, perhaps less is known by the average person about gas than any other. Baltimore's manufactured gas is supplemented by large quantities of a bye-product of the coke ovens at the Bethlehem steel mills at Sparrows Point. The coke oven gas is piped the dozen or so miles from Sparrows Point into the Spring Gardens plant of the Gas Company, from which comes all the gas used in the Baltimore territory. The location of the Spring Gardens plant on an inlet of the Patapsco gives it exceptional transportation facilities, since deep-draft oil tankers and coal barges may dock there. Railroad yards also are nearby. There are fifty-seven acres in the Spring Gardens plant, given over to huge coal piles, oil tanks, gasholders, and large buildings for the manufacture, purification, testing, and control of the gas.

The article goes on to state that the mains leading from Spring Gardens serve an area of 175 square miles, which has a population of about 895,000. The mains extend into Baltimore, Howard, Anne Arundel, and Prince George's Counties, going as far as twenty-eight miles from their source.

The first gas company to be granted a franchise in America was the Gas Light Company of Baltimore, under whose original charter rights, supplemented and extended, the present company operates. Rembrandt Peale, who introduced gas lights to Baltimore in his museum, was one of the founders of the Company. Scharf's history of Baltimore states that the first gas lamp on the streets of Baltimore stood on the corner of Baltimore and Holliday streets and was first lighted on Feb. 7, 1817. The first public building to be lighted by gas was the old "Mud" or Belvidere Theatre at North (Guilford Avenue) and Saratoga streets, which was just across the street from the first gas-works.

Notes from Scotland.

The Stonehaven Gas Company have launched a scheme whereby they hope to bring to the public notice many improvements and new apparatus. They have opened a showroom at the gas-works, and have cordially invited the public to inspect the appliances on view.

The Annual Report of Kirkcaldy Gas Company shows a profit of £16,383, the income amounting to £45,941, and the expenditure to £29,557. After various sums had been deducted from the gross profit, there was left a surplus on the year's accounts of £1519. The total surplus of the undertaking now amounts to £11,134. The quantity of gas manufactured during the year amounted to 200,085,000 c.ft., being an increase over the previous year of 6,142,000 c.ft.

The British Electric Traction Company, in conjunction with Messrs. Harris Forbes & Co., has just acquired the whole of the 50,000 £1 shares of Cowdenbeath Gas Company, giving 44s. for each fully paid share and 11s. for each share 5s. paid. By this acquisition, the British Electric Traction Company has now a wide interest in Scottish gas undertakings, other holdings acquired during the past year including the Dalkeith, the Gorebridge, the Haddington, the Loanhead, the Penicuik, the Tranent, and the Prestonpans Companies. The Cowdenbeath Company was formed in 1891, and serves three parishes in Fife, the annual make of gas being about 100 million c.ft.

A Large Attendance is Expected at Rothesay for the Seventieth Annual General Meeting of the North British Association on Sept. 10. On the previous day the Golf Competition will be held on the Corporation Course, which has been granted by the Town Council for the occasion. The course was originally laid out by the late Ben Sayers, and more recently was extended and improved under the eye of James Braid. For those who may wish that these great masters had not attended so skilfully to their jobs, consolation is at hand in magnificent scenery, which includes a view from the 8th tee of Loch Striven, Loch Ridden, and Loch Fyne. The Annual Meeting of the Golf Circle will be held, after play, in the Glenburn Hydropathic.

GAS SERVICE - - -

Discussed from the viewpoint of the Gas Salesman

Selling Gas in a Coal Mining District.

There are a number of particular difficulties attached to the distribution and sale of gas in a coal mining area. First and foremost, miners receive exceedingly cheap coal, of which they make the fullest use for their own convenience and comfort, and a miner's house, therefore, where there is a large coal fire burning at next to no cost throughout the year, does not seem a promising place for gas business.

Nevertheless, Mr. I. G. Jenkins, the progressive Engineer and Manager at Abertillery, is yearly increasing his sales by a service policy run on the most up-to-date lines—as can be seen from an address he gave not long ago to the South Wales and Monmouthshire Salesmen's Circle, published in the "Gas Salesman" for August.

The Industry, he says, has made, and still is making, excellent progress, and one of the chief reasons is the efficient service which is given to our consumers. The majority of engineers, managers, and salesmen have long since ceased thinking that gas will sell itself. Competition from coal, oil, and electricity has made us all the keener salesmen, and imbued us with the one desire to make known to the British public the many uses to which gas can be applied to-day. Yet, notwithstanding our efforts, some of our consumers are still unaware of the new methods and processes which have taken the place of the old. It is therefore imperative that we should enlist the whole-hearted support of every employee, on the manufacturing as well as on the distribution side, and go forward with a determined effort to deal with the useful application of gas for lighting, cooking, heating, and industrial uses.

A Progressive Policy.

Mr. Jenkins then goes on to make a few observations on the distribution and sale of gas in Abertillery, where there are no factories or large industrial users, and where, in addition to the difficulties already mentioned of introducing gas into the miner's house, considerable further troubles are encountered in regard to ground subsidence causing fractured mains and naturally leading to an extraordinarily high percentage of unaccounted-for gas; this figure has been as high as 26·9 p.ct., though in the last financial year it has been brought down to 16·6 p.ct.—the lowest on record. To mention one case only, in a street of about 120 houses supplied by a 3-in. cast-iron main, subsidence caused every service to be broken off, and, in addition, the main suffered serious damage, in the course of twelve months.

The Abertillery Undertaking always supplied three free lighting fittings to slot consumers, and some four years ago they decided to include the burners, mantles, and globes. In February of this year, Mr. Jenkins decided to install a fourth light complete with burner, globe, and mantle free of charge. This scheme has met with success, and an average of 120 lights per month is being fitted.

In Mr. Jenkins' opinion, good public lighting is one of the finest advertisements an undertaking can have, and in his area they supply gas to and maintain 500 street lamps. Special attention is given to this side, and the lights are kept clean and efficient. It certainly would be very difficult, he observes, to convince a customer that gas lighting is all right if the street lighting is all wrong.

Free Cookers.

In spite of the difficulty of persuading the miner's wife of the advantages of gas for cooking, the Department seem to have done very well. First of all they introduced the boiling ring, stressing the economy and the saving of time when preparing the early morning tea before the miner left for the colliery. During a period of three to four years, they have fitted free of all charge 2500 rings, and Mr. Jenkins is confident that the capital expenditure has been worth while. A hire purchase scheme for the supply of high-grade cookers was in operation in 1926, but Mr. Jenkins became convinced that, if gas was to be used extensively for cooking, the Undertaking would have to provide the apparatus free of hire purchase or simple hire charges, and he recommended his Committee to supply and fix a packed cooker, with white enamel door, two boiling burners and grill, at a nominal delivery charge of 5s., with no further hire charges whatever. During the last 18 months 862 of these cookers have been fitted, and hopes are entertained of fixing a further 300 to 400 during the current year.

High-grade gas fires, wash-boilers, irons, bowls, &c., are sold on the easy payment system, with monthly or quarterly instalments over a period of 2, 3, or 5 years. No charge is made for labour.

In conclusion, Mr. Jenkins deals with showroom policy—"the 'hub' on which gas sales turn"—and general publicity, of which, he says, there is still need in the Industry. Notwithstanding electrical competition and the difficulties of the particular district, already referred to, the output of gas by the Abertillery Undertaking is steadily increasing. Last year the increase in the gas sold was 4,450,600 c.ft., equal to 6·5 p.ct., and during that period the price was reduced by 7½ p.ct.

Maintenance.

Some twelve months ago the Harrogate Gas Company commenced a more intensive system of maintenance than had previously operated, and those of our readers who have not the opportunity of seeing the August issue of the "Gas Salesman" may be interested in a few of the details given by Mr. H. Wadsworth, the Distribution Superintendent, in the course of a paper read before the West Riding of Yorkshire Salesmen's Circle.

Gas apparatus generally requires certain attention periodically if it is to be maintained in its most efficient state, and Mr. Wadsworth emphasizes the fact that the Industry must not wait until the lack of such attention develops into a complaint. While appreciating the necessity of maintenance, however, it was felt that the scheme adopted by the Harrogate Company must be made to pull its weight. The fact that service is given free ensures an entry to consumers' premises, and the maintenance fitter is thus able to note all the appliances fixed on the premises. Record cards are ruled so that it is only necessary to note in the appropriate column the number of appliances in use. On each succeeding visit the number of appliances is again noted, which provides a means of checking development of business as based on the increasing popularity, or otherwise, of the different types of gas apparatus in use. Thus any consumer found to be without a cooker, for instance, is written to and suitable literature enclosed, this being followed up by a personal call.

Monkeys!

Our American cousins are nothing if not original in their gas showroom window displays, and the introduction of live monkeys to the window display is in keeping with this originality of ideas. We have heard from America of the baby as a window display salesman, but the live monkey as a salesman strikes a new note. This creature, however, seems to be well-favoured by gas undertakings on the "other side," and, what is more, he seems to be well adapted to any kind of gas appliance display from the fire to the refrigerator. Not long ago the Portsmouth Gas Company, Virginia, introduced a live monkey into their gas fire window display, with the following appropriate notice: "This live monkey demonstrates the need of man and beast for warmth on days when the sun is tepid and blue skies are grey." And the monkey actually carried out the spirit of the show card claim most of the time—except when in restless mood. It was noticed, too, that even during bright, cool days, the monkey manifested a fondness for his post beside the gas fire.

Now we hear from the Arlington Gas Light Company, Mass., that this adaptable creature is of equal assistance in a gas refrigerator display. The occasion (described in the current issue of the "Gas Salesman") was a display which bore a message on the window: "No moving parts to monkey with—Gas Refrigeration," with live monkeys doing their bit to make the statement most realistic. Due to the clever antics of the monkeys, crowds packed the pavements in front of the window day and night. Time after time traffic was held up by the crowd and the curious motorists who parked their cars in the street. The discussion the window created was quite amazing to the Gas Company. School children, business men, civic organizations—everyone was talking about the display, and Arlington soon became quite familiar with the subject of gas refrigeration.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

NEW LIQUID PURIFICATION PROCESS AT HAMBURG.

H. Müller, in "Das Gas-und Wasserfach," 1931, 74, 653-657 (July 11), describes the process of liquid purification invented by Fischer and developed by Dr. Brandt, the chief chemist of the Hamburg Gas-Works.

In the process, the sulphuretted hydrogen is absorbed in a solution of potassium ferricyanide and potassium carbonate, whereupon potassium ferrocyanide, potassium bicarbonate, and sulphur are formed. The latter is removed by filtration and, after being washed, yields sulphur of a purity of 99·5 p.ct. The filtered solution, with the washings, is electrolyzed, and as a result the purifying medium is regenerated, hydrogen being obtained as a by-product

$$2K_3Fe(CN)_6 + 2K_2CO_3 + H_2S = 2K_4Fe(CN)_6 + 2KHCO_3 + S$$
$$2K_4Fe(CN)_6 + 2KHCO_3 = 2K_3Fe(CN)_6 + 2K_2CO_3 + H_2$$

The net reaction thus involves the separation of the sulphuretted hydrogen into its constituents

$$H_2S = H_2 + S$$

Complete removal of the sulphuretted hydrogen is claimed.

The purifying medium is prepared from a solution containing approximately 2-2·3 lbs. of potassium ferrocyanide and 0·6 lb. of potassium bicarbonate per gallon, and this is electrolyzed to obtain partial conversion of the ferrocyanide into ferricyanide.

A special diaphragmless electrolyzer was devised after much investigation. This consists of a box formed from two end-plates between which is a series of rectangular electrodes separated by rubber packing round the edges, thus forming a water-tight chamber. A large central space is left between the two middle electrodes. The solution to be electrolyzed is admitted at the bottom of the two end-plates and passes across the electrodes in an upward and downward path, holes being provided near the bottom and top of alternate electrodes to enable the liquid to take this course. At a still higher level in the electrodes are holes which enable the hydrogen generated to pass into the central space and thence out of the cell. The electrolyzed liquor is run off at the bottom of the central space at a rate equal to that at which the liquor flows in. Positive terminals are connected to the two extreme electrodes, and the negative terminal to the two central ones; hence the end electrodes have only one polarity, whereas each intermediate electrode has one positive and one negative face. The question of choosing a suitable material for the electrodes was an important one, and a satisfactory metal was found, though no information as to its composition is given. The electrolyzer illustrated in the original article contains 12 electrodes.

The electrolyzer in use has electrodes 9·8 ft. high by 2·6 ft. wide. These have a useful area of 21·5 sq. ft. on each side. The voltage is 1·9-2·2 volts per cell, and the current is 400-600 ampères, corresponding with a current density of 20-30 ampères per sq. ft. The total voltage depends on the number of plates, and the electrolyzer can be adapted to the ordinary voltages of 110 and 220 volts.

One gallon of the purifying liquid can deal with 100 c.ft. of water gas having a content of 170 grains of H_2S per 100 c.ft., though, to insure complete removal of the sulphuretted hydrogen a larger volume is used—*e.g.*, for 70,000 to 100,000 c.ft. of gas per hour the volume of liquor circulated may be 1750 to 2200 gallons per hour.

A brush washer is employed, but the one in use has rather a high power consumption, and trials of other types are in progress. The choice of the washer must take into account the fact that the sulphur, first formed in the colloidal condition, shows a tendency to adhere to surfaces and not to be washed out with the outgoing liquid.

In view of the large volume of liquid circulated, it is preferable not to filter it as a whole, but to thicken the floating sulphur in a settling and storage tank and to pass only the concentrate to the filter press. Condensed water is used for washing the filter cake, the washings being added to the liquor. The dilution thereby caused is counteracted by evaporation which occurs during absorption of the sulphuretted hydrogen, since the reaction is exothermic.

The installation described is used for the purification of water gas and produces a sulphur of a high degree of purity and perfectly suitable, by reason of its fineness, for use in rubber manufacture and in horticulture. The hydrogen produced is also very pure and contains less than 1 p.ct. of oxygen, and, depending on the bicarbonate content of the liquor and the carbon dioxide content of the water gas, some 3-4 p.ct. of carbon dioxide.

The economics of the process is linked up with the cost of power and the selling value of the sulphur. Since current is used throughout the day, the cost of the power may be put at a low value—namely 0·25-0·5d. per kw.-h. Since removal of 1 lb. of sulphur requires approximately 1·8 kw.-h., the cost of power per ton of sulphur recovered would, at $\frac{3}{4}$d. per kw.-h., be approximately £6. The selling value of the sulphur has been found to be at least £6 per ton, so that the cost of the power is met by revenue from the sulphur.

As long as the hydrogen is simply returned to the gas, its value would merely be on a calorific value basis, but conditions would be different if the hydrogen were used for other purposes—*e.g.*, for hydrogenation.

Advantages of the process are the small ground space required, the absence of smell, the simplicity of operation, and the production of two marketable products. In a large-scale plant handling upwards of 3 million c.ft. of gas per day, the cost of purification would, according to the author's calculations, be approximately two-thirds that of dry purification.

DEMONSTRATION OF GAS DRIVEN MOTOR VEHICLES.

In connection with the series of fuel days at the French Colonial Exhibition, demonstrations of the potentialities of gas driven vehicles were given over a selected route of approximately 50 miles on June 21. The results and a description of the vehicles are given in "Journal des Usines à Gaz," 1931, 55, 359-362 (July 20).

Six 4-cylinder vehicles including one omnibus, one charabanc, and four lorries took part. Details are as under.

The gas was contained in cylinders under pressure.

Vehicle Number.	1.	2.	3.	4.	5.	6.
Description . . .	Omnibus	Lorry	Lorry	Lorry	Lorry	Charabanc
Horsepower . . .	80	48	48	76	76	76
Compression ratio .	5·4	7	7	6	6	6·2
Engine speed, revs. per min. . . .	1300	2300	2500	1800	1800	2500
Speed rating, miles per hour . . .	22	35	37	25	25	37
Weight unloaded, tons.	7	3·3	3·6	7	7	3·5
Useful load—						
Number of passengers . . .	38	..	..	..	..	14
Tons	..	2	2	5	5	..
Number of gas cylinders	12	6	8	2 + 2	2 + 2	6
Capacity per cylinder, c.ft.. . . .	1·65	1·65	1·65	1·7 & 2·8	1·7 & 2·8	1·7
Weight per cylinder, lbs.	183	165	165	114 & 308	114 & 308	114
Material of cylinder	Steel	..	..	Nickel chrome steel and steel		Nickel chrome steel
Total weight during test, tons . . .	8	5·3	5·4	11	11	..
Distance travelled, miles	53	48	49	44	46	..
Gas used, c.ft. . .	2300	1300	1300	1750	1700	..
Mean speed, miles per hour . . .	15	20	18	14	18	..
Maximum speed, miles per hour .	26	33	33	26	25	..
Gas consumption per ton mile, c.ft..	5·4	5·1	4·9	3·4	3·3	..

In the case of vehicles 4 and 5, the last portion of the journey was made on petrol since the capacity of the gas cylinders was, as was known would be the case, insufficient for the complete journey.

RECENT ADVANCES IN THE AUTOMATIC CONTROL OF COKE OVEN PLANTS.

L. Litinsky in "Journal des Usines à Gaz," 1931, 55, 350-359 (July 20), describes methods for the automatic control of the ammonia and benzole plant in coke-ovens.

The ammonia content of the still effluent may be recorded automatically by means of Reineke's apparatus in

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DISTILLING COKE OVEN TAR TO PITCH
T.I.C. PLANT
DISTILLING WATER GAS TAR TO PITCH
TAR
T.I.C. PLANT
DISTILLING VERTICAL RETORT TAR FOR ROAD MAKING PURPOSES
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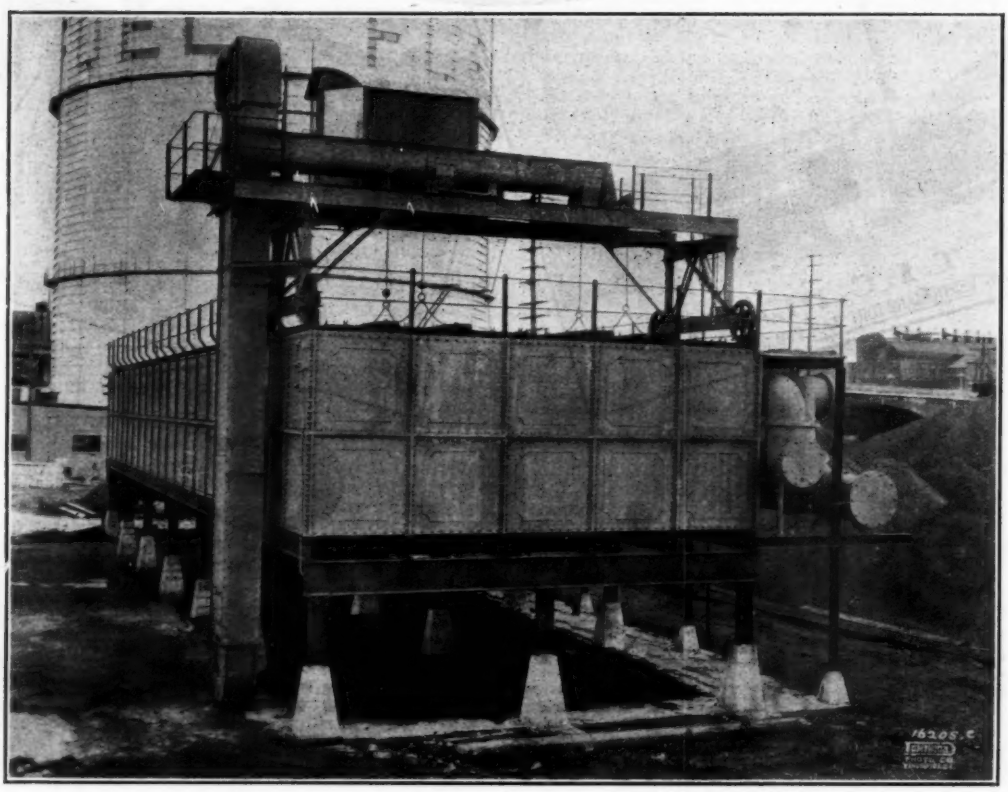
PURIFIERS.

Four Purifiers, 25' 0" square by 10' 0" deep, erected on Joist Structure, complete with 30" dia. main Inlet and Outlet Pipes; 24" dia. single Weck Valves; 30" dia. Main Reverser Valves and Oxide Handling Plant, at the Gasworks, Vancouver, British Columbia.

SPECIAL FEATURE:—OXIDE HANDLING PLANT comprising TRAVELLING ELEVATOR, CONVEYOR, and LIFTING APPARATUS for Purifier Covers COMBINED.



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which the effluent is made alkaline with soda, the mixture passing to a vessel heated electrically and maintained at a uniform temperature of 95° C. A current of air (2-4 c.ft. per hour) at a constant pressure drives the evolved ammonia into a bulb in which is situated an electrically-heated platinum wire and thence passes to atmosphere. A thermo-couple is welded on to the platinum wire. Presence of ammonia causes the temperature of the wire to rise, the temperature rise increasing with the concentration of ammonia. The galvanometer attached to the couple is graduated in terms of the ammonia concentration. A simpler type of apparatus is applicable for measuring the ammonia content of gas.

Another old type of apparatus for the same purpose depends on the decomposition of the ammonia by sodium hypobromite and measurement of the nitrogen thereby formed.

Junkers have recently introduced a further apparatus on the Remelé system. An absorption vessel is supported in equilibrium from a balance of the chainometric type. A measured volume of the gas is passed into the absorption vessel, and the ammonia is absorbed. The system is thrown out of balance by the consequent increase of weight and is restored to equilibrium by an electrical device, the weight necessary to accomplish this being automatically recorded. The apparatus may be used for a variety of purposes—*e.g.*, for benzole determination in which case the absorbent is activated charcoal.

The Ranarex apparatus depends on the continuous measurement of the density of gaseous mixtures—*e.g.*, mixtures of ammonia and air.

An apparatus marketed by Siemens & Halske depends on the variation of the thermal conductivity of a gaseous mixture with variations in its composition.

The Hydro-relay apparatus measures the difference of pressure at the base of two tubes of equal height traversed by two different gases. In the Debro apparatus [Paul de Bruyn, G.m.b.H., Düsseldorf-Oberkassel], use is made of the difference in pressure created by a constriction—*e.g.*, a Venturi tube.

For benzole plant control, the Reineke apparatus may be used. This compares the candle-power of the gas before and after the benzole scrubbers. In the Mallinckrodt apparatus, the benzole is absorbed in tetralin and liberated from the solution by distillation. It is then measured.

Liquid meters of various types and suitable for the automatic measurement of wash oil and ammonia liquor are also described.

DRYING COAL PRIOR TO . . CARBONIZATION . .

Notes on a Test carried out by Mr. R. A. Mott, of the Department of Fuel Technology, Sheffield University

A few weeks ago Mr. R. A. Mott, M.Sc., F.I.C., of Sheffield University, investigated the "Universal" coal dryer installed at the Barrow Collieries, Barnsley. This dryer, which is manufactured by the Brightside Foundry and Engineering Company, Ltd., of Sheffield, is of simple design, and Mr. Mott is of the opinion that it is likely to be of great use to the coking industry. This is what Mr. Mott says of it: "With its large capacity, high thermal efficiency, low power consumption, low ground space requirements, low upkeep costs, simplicity in control, and reliability for long periods of service, it overcomes the disadvantages which have prevented the widespread adoption of other dewatering and drying appliances capable of giving coal of less than 10 p.ct. moisture content.

"The coke oven gas used cannot be charged against the dryer, since even in a coke oven of modern design the thermal efficiency is lower than that of the 'Universal' dryer, while in ovens of older design about twice the amount of gas as used in the dryer is necessary to evaporate the same amount of water in the coke oven.

"The size of the coal, its volatile matter content, and its coking properties are quite unaffected by the passage through the dryer. The dryer should therefore make a wide appeal in the near future when so many re-building schemes are likely to mature. The reduction of coking time with coal of 5 p.ct. lower moisture content increases the daily coking capacity of each oven, and 2 to 5 fewer ovens would be required to carbonize 400 to 1000 tons of coal per day. Since the capital cost of each oven saved is £2200, the reduction in capital cost of the ovens will more than cover the cost of installing a 'Universal' dryer."

At the Barrow Collieries the dryer (average hourly throughput 42 tons for coal of 12 p.ct. water content for an evaporation of 5-6 p.ct. of water) and the burner setting occupy a ground space of only 16 ft. by 14 ft. with a head room of 24 ft. 6 in. The total power consumption is 19 H.P., or less than 0·5 H.P. per ton of coal treated.

The removal of water from washed coal, states Mr. Mott, is one of the most important problems facing the coal industry. High moisture content in coal is one of the most fruitful causes of complaint, since moisture is only inefficiently removed in a coke oven or boiler, and guarantees of maximum moisture content are therefore becoming a frequent requirement of purchasers. It is now clearly established that wet cleaning of coal is more efficient than dry cleaning, so that suitable means of removing moisture from wet washed coal is an urgent requirement.

Washed slack of less than ⅜ in. size can only be dewatered to 15-18 p.ct. moisture content by the use of drainage hoppers and dewatering screens, unless the drainage time in hoppers or wagons is unduly prolonged. The use of high-speed centrifuges has not met with much success in this country for various reasons. The cost of replacement of screens is comparatively high, and skilled labour is required for their mechanical supervision; the power consumption is high (1 H.P. per ton); and a large proportion of the feed passes through the screens with the effluent water and requires to be re-handled. In one plant where the feed coal contained 40 p.ct. less than ⅛ in. size, 10 p.ct. of the (dry) feed is discharged through the screen plates, and expensive filter beds with the re-handling labour costs are required. Moreover, a considerable amount of breakage of the coal occurs.

"Heat dryers," observes Mr. Mott, "have not been widely used in this country except for drying coal used for pulverized fuel firing. The double shell horizontal rotating dryer most generally used has the disadvantage that an enormous ground space is required. The power requirements of double shell dryers are high. Owing to the high temperature of the heating gases used (750° C.) considerable danger of firing occurs, and a complicated system of control is necessary."

Mr. Mott goes on to say that the "Universal" dryer, Type C, used for coal drying overcomes the disadvantages of the de-watering and drying appliances referred to. The dryer, which is made entirely of cast iron, is vertical, and uses a gravity feed from section to section. In each section of the dryer there is a six-sectioned spider. The spiders in different sections are staggered and revolve in opposite directions in adjacent sections. A 40-45 tons per hour unit only requires a ground space of 5 ft. by 13 ft. 6 in., and a complete installation with coke oven gas firing is installed in a building 34 ft. 6 in. to the top of the feed hopper. The gravity feed is so efficient that less than 2 H.P. is required to pass 40-45 tons of coal through the dryer itself. While power expenditure is not always a very important factor at collieries, the low power consumption may be taken as an indication of low upkeep costs in mechanical control.

The drive for the dryer consists of an endless chain passing over toothed wheels by means of which the six-sectioned spiders or retarders in each section of the dryer are rotated. The speed of rotation is only 1·26 r.p.m. for a capacity of 40-45 tons per hour. The mechanical wear is therefore negligible. The dryer sections are built of cast iron with a special heat-resisting mixture for the bottom section to which the hottest gases are admitted. Since the average temperature of the hot gases entering is 420° C. at the hottest point, an ample margin is available in contingencies before the danger-point of cast iron (600°-625° C.) is reached. Replacements of sections through heat distortion are therefore unlikely. The low temperature of the gases entering is a very important factor in making the dryer simple to control, since it overcomes the danger of firing. The coal is only in the dryer for 4½ mins. (compared with 20 mins. in a double shell type of horizontal dryer) and follows an almost vertical path (instead of a helical path as in the horizontal dryer). The liability for building up in the dryer is therefore very small. Inspection plates are fitted to each section, and any caked coal can easily be removed. There is no wear on the metal parts of the dryer.

HYDROGENATION OF COAL

Direct or Indirect?

We reprint the following letters on the subject of the production of oil from coal which were published in "The Times," together with a statement by Mr. Harry McGowan, Chairman of Imperial Chemical Industries, Ltd.

Prof. F. G. Donnan, London University ("The Times," July 31).

SIR,—The enormous part played by petroleum oil and its products in the modern world is a fact of the utmost importance. At present Great Britain consumes annually nearly 9 million tons of these materials, all of which have to be imported into this country. From the point of view of national independence and defence, and also of national prosperity, we are in a really perilous position, since we are entirely dependent on overseas supplies.

The process whereby coal can be converted into the maximum amount of oil is easily explained. The finely ground coal, mixed with a certain quantity of oil, is subjected to heat in an atmosphere of compressed hydrogen gas. This process is known as "hydrogenation," since the hydrogen gas enters into chemical combination with the coal or its products. The operations may be so conducted as to yield high-grade petrol as sole product, or a variety of products such as petrol, kerosene, Diesel engine oil, lubricating oil, and fuel oil. The process has been worked on a large commercial scale in Germany, and for several years 100,000 tons of petrol were produced annually by the hydrogenation of brown coal.

During the last five or six years the hydrogenation of British coal has been very carefully investigated at the Billingham Works of Imperial Chemical Industries, Ltd. The process has been closely investigated in a plant capable of treating 20 tons of coal a day, and I have had the privilege of being in general touch with this work. It has demonstrated the commercial feasibility of manufacturing high-grade petrol and other oils from British coals, and has shown that petrol of a quality equal, if not superior, to the finest natural motor spirit can be produced at a cost of about 7d. per gallon.

Though the 20-ton plant—referred to above as in operation at Billingham—cannot be regarded as a commercial unit, surely the point has now been reached at which commercial production is justifiable, and should be taken up in the national interest? Let us consider, for example, a plant capable of treating 1000 tons of coal a day, and producing 213,000 tons of petrol annually from British coal. As a fair estimate, let us assume that each ton of coal hydrogenated would produce 60 p.ct. of its weight in petrol. We must remember, however, that coal is also required for the manufacture of the hydrogen, and for the production of the steam and electric power required in the process, making 4 tons of coal necessary for each ton of refined petrol. The plant envisaged would therefore require about 850,000 tons of coal per annum. It has been calculated by experts that a plant of this character would give permanent employment to 5000 men, of whom 3000 would be miners, in addition to the employment during the construction period of some 17,000 men for (say) two years.

The flexibility of the hydrogenation process is such that the plant could be employed to produce petrol only, to produce petrol, Diesel engine oil, and fuel oil in various proportions, or to hydrogenate various types of tar with a yield of petrol approaching 80 p.ct.

I am convinced that the security and future prosperity of this country urgently demand the erection and operation of such a plant, and that we possess sufficient knowledge and experience to justify the project. If Government help in some form or other be necessary, it is difficult to think of any plan better calculated (1) to start a new industry necessary for our security and national defence; (2) to utilize our great natural asset, coal; (3) to relieve unemployment; and (4) to employ men in their own natural trades.

From the point of view of our national requirements of petroleum oil and its products, the plan proposed would be only a modest beginning. Suppose it were successful. Suppose then that slowly and gradually we could build up an industry that would completely cover our national requirements of all classes of "oil." Let us put these at 10 million tons per annum, for the sake of argument. Were we to manufacture these 10 million tons of mixed oils by hydrogenation of British coal, expert calculation indicates that we should require annually about 30 million tons of coal (the heavier oils requiring less hydrogen than petrol), and that the industry would give permanent employment to some 90,000 men at the works and some 100,000 men at the mines, a total of nearly 200,000 men. Great Britain would then be completely independent of foreign supplies of motor spirit and fuel oil. The building up of such an industry would be of enormous benefit to many ancillary industries in this country—for example, to the iron, steel, and engineering industries.

It must not be forgotten that owing to world over-production and a severe price-cutting war the present prices of petroleum and petroleum products are comparatively low. It does not follow that this will always be the case. Only a few years ago prices were considerably higher. They may rise again owing to international agreements and control of production. We are exposed as a nation to uncertain dangers and risks. It is surely the part of wisdom to look ahead and at least to begin to prepare ourselves. There is urgent need for action to-day, and no enterprise is more worthy of Government encouragement and help.

It is important to bear in mind that the hydrogenation process differs in its essentials from the low-temperature carbonization process. The latter produces as its main products gas and semi-coke and perhaps up to 8 p.ct. of liquid products. If this process has national advantages it will no doubt be persevered with, but because of its production of products other than oil, which have to be disposed of, it contributes to but does not offer a solution of the problem of oil production in Great Britain, as does the hydrogenation process, with which alone I have been dealing.

Commander Colin Buist, Low-Temperature Coal Distillers' Association ("The Times," Aug. 1).

Prof. F. G. Donnan, in a letter published in "The Times" to-day, has stated that the hydrogenation process is now working on a commercial scale in Germany and that for several years 100,000 tons of petrol have been produced annually by the treatment of brown coal. Your correspondent, however, has omitted to mention the fact that this same brown coal is first treated by a process of carbonization for the production of crude oil, and it is this latter substance which forms the raw material for the hydrogenation plant.

The hydrogenation process was first developed at Mannheim, in Germany, by Dr. Bergius, and originally utilized pulverized coal as a raw material. After extensive full-scale trials, however, the Germans finally abandoned the idea of treating raw coal by hydrogenation and now employ this proces to convert crude oil into Diesel oil and motor spirit.

With regard to our own country, the Lord of the Treasury announced in the House of Commons on May 5 last that the Government were prepared to grant a large sum of money to the Department of Scientific and Industrial Research so that a commercial-scale hydrogenation plant could be erected at East Greenwich to treat the tar oils produced from coal by carbonization at low temperatures. This work is now proceeding, and it is no secret that the most important results have been obtained during the last two months. Hydrogenation is thus the principal ally of carbonization, and the successful completion of the experiments now taking place at East Greenwich will do much to establish the "oil from coal" industry in Great Britain.

Prof. J. S. S. Brame, Royal Naval College, Greenwich ("The Times," Aug. 5).

SIR,—In a recent lecture before the Royal United Service Institution I laid stress upon every consideration being given to the problem of obtaining "oil" (using the term in its widest sense) from coal for Service purposes. Dependence on oversea supplies may prove fatal in time of war. I am, therefore, by no means antagonistic to any scheme which will help towards this, even if the "oil" costs considerably more than supplies from petroleum, which it is certain to do at the present output and prices of petroleum products. We must pay for safety.

While possibly the hydrogenation of coal process has been made technically successful, there are several important considerations which Prof. Donnan, in his letter published in your columns on July 31, has not mentioned, but which are vital to the economic success of this process in relation to other processes for attaining the same ends.

With regard to Germany, experience there with bituminous coal has been very little; with brown coal Prof. Donnan says that for several years 100,000 tons of petrol were produced annually. To-day I am credibly informed the direct hydrogenation of coal is practically non-existent. As your correspondent (Aug. 1) pointed out, hydrogenation is being applied almost exclusively to the tars obtained by low-temperature carbonization.

There are important considerations which are vital to the commercial success of any hydrogenation process. In the first place no information has been made public of the capital costs, life, and depreciation of such plants in relation to the throughput of material a day, but they are unquestionably very high. The plant works at 2500 lbs. to 3000 lbs. pressure per sq. in. and about 460° to 480° C. The fuel and oil paste has to be pressed in continuously and the hydrogen supplied under these high pressures. When Prof. Donnan proposes a plant to treat 1000 tons of coal a day has he any idea of the capital cost?

Further, there is the cost of hydrogen, a difficult figure to

arrive at. In the report of the Nitrogen Products Committee (1920, p. 245) it is stated that "under pre-war conditions by means of a process such as the water gas catalytic process it would amount to 2s. 6d. per 1000 c.ft. delivered under compression." While hydrogen of such purity as here referred to would not be required, in post-war days it is very unlikely that a cost less than 1s. per 1000 can be assumed, even from the gases obtained in the process. As 10 c.ft. of hydrogen are required per lb. of coal, the hydrogen cost would be over 22s. per ton of coal.

Fuel experts will be surprised to learn that each ton of coal would produce 60 p.ct. of its weight in petrol, approximately 150 gallons per ton, and would like to know whether this was from a bituminous coal and in a commercial plant; further, whether the figure of 7d. a gallon as the cost of production is inclusive of charges on capital, depreciation, &c., or merely production cost.

There is no question about the direct hydrogenation of coal producing a far higher yield of liquid fuel products than any other process, and in Germany great expectations were based on the process. Yet it has been practically abandoned in favour of hydrogenation of tars produced by carbonization—material much more amenable to treatment. It is still a matter for investigation whether this second step is worth while in view of the high first costs and operating expenses of these high-pressure plants. Investigations on these lines are being carried out in this country, and it has been announced that some £35,000 is to be allocated for plant and about £8000 per annum for staff, &c.

Statement by I.C.I. Chairman.

The following statement has been issued by Sir Harry McGowan, Chairman of Imperial Chemical Industries, Ltd.:

So much interest is being shown at the moment in the question of hydrogenating British coal into oil fuels that, as Chairman of the Company which has done all the large-scale work on hydrogenation in this country, I may perhaps be allowed to clarify the position by making the following points:

Hydrogenation has already reached the stage at which we have a plant at Billingham capable of hydrogenating 15 tons or more per day of bituminous coal. Of the clean, dry coal so treated, some 60 p.ct. by weight is recovered as refined petrol, which has been utilized with complete success for many months past in motor vehicles of all descriptions.

This fact, together with the experience which our associates in the recently formed International Hydrogenation Patents Company have already had in the production of 100,000 tons per year of petrol from brown coal and brown coal tar, which experience is now fully available to us, enables me to state that:

(1) Although high pressures and temperatures are used, our experience in the very similar technique of ammonia manufacture has enabled us to overcome satisfactorily all difficulties which have hitherto arisen.

(2) The manufacture of hydrogen is a subject on which we have unique and extensive knowledge; neither the quantity required nor the price at which it can be produced presents any obstacle to the successful development of the hydrogenation process on an economic scale.

(3) I am quite satisfied that it is now practicable to build in this country a plant for the production of petrol from bituminous coal. A plant to hydrogenate 1000 tons of clean, dry coal per day could produce No. 1 motor spirit and sell it at present standard retail prices with a small profit, after allowing for all costs of raw material, manufacture, repairs, obsolescence, and distribution.

It is not contended, however, that such a profit as the above would attract capital. It is mentioned as an indication of the fact that the hydrogenation process has already reached a stage at which only a very slight rise in the price of petrol is required to render it a self-supporting commercial proposition.

"SAFETY FIRST"*

Mr. H. C. Dungey, of Yorkshire Tar Distillers, comments on the repair and cleaning of tar stills

From the earliest days of the tar industry the necessity for cleaning and repairing the stills has presented various problems to the tar distiller, not the least of which is the difficulty of carrying out these operations under safe conditions.

The special risks met with in cleaning stills are:

(1) Fire or explosion.
(2) Gassing.
(3) Sickness resulting from inhalation of poisonous fumes in quantities insufficient to produce actual gassing effects.
(4) Injuries resulting from the contact of corrosive or irritating substances with the skin.

In the case of tar stills the chief risk is undoubtedly that of gassing. During the process of distillation various noxious gases are evolved. These being generally heavier than air remain in the still after the pitch is run off. The gas most usually encountered is sulphuretted hydrogen, which is poisonous in minute quantities. The Chemical Works Regulations require that the still shall be inspected and certified by a responsible person before any person enters the same. These regulations are amplified in the procedure prepared and approved by the Association of Tar Distillers, and the Association of British Chemical Manufacturers, the chief addition being that the responsible person before certifying that the still is safe to enter shall carry out a further test by introducing a cage of white mice. This is a most valuable precaution, if the mice remain normal for five minutes it is a certain indication that the atmosphere is safe where they are. After making his examination and test the responsible person must certify that the still is, or that it is not, isolated and free from danger. If it is not free from danger a man may only enter with a breathing apparatus and life line.

To prepare the still for examination prior to cleaning it must first be steamed out to expel foul vapours, &c. A usual practice is to break the manhole about half an hour after running off the last charge of pitch, and introduce steam by means of a flexible pipe, the manlid being loosely covered by sacking. A more efficient method is to turn steam into the still through the perforated steam pipe in the channel, immediately the pitch is run off and before the manlid is broken. The steam together with the vapours removed from the still pass through the condenser in the usual way. When oil ceases to come over, steam is shut off and the manlid broken. The still is then isolated from the charging pipe and steam main, the swan neck is disconnected from the condenser, and the tail pipe from the pitch cooler, either by actually breaking the joints or by the insertion of blanks. The better practice is that the joints should be completely broken.

These are most important precautions. In the past many accidents, frequently fatal, have occurred through vapours from a still which was working finding their way through receivers and condenser into stills which were being cleaned.

An important improvement in the construction of tar stills introduced during recent years is the provision of a bottom manlid. The tail pipe is enlarged to about 18 in. diameter, and is closed by a flat plate, to which the run off tap is fixed. On removal of the top and bottom manlids a through current of air is set up which thoroughly ventilates the still and makes gassing practically impossible. The still also cools more rapidly, and cleaning can be carried out much more quickly, since the dirt can be thrown out at the bottom instead of having to be drawn through the manlid with bucket and rope. The advantages of a bottom outlet from the safety point of view were very forcibly demonstrated a few weeks ago when an accident occurred at a Scottish tar distillery. It appears that a man who had been told to remove the top manlid, in order that the foreman might inspect the still, exceeded his instructions and entered the still. He was overcome by gas and became unconscious before he could escape. Three other men successively entered the still to rescue him, but were all immediately gassed. The bottom manlid was removed with great haste by another man, and all four men were rescued in an unconscious condition. They were removed to a local infirmary, but were found very little the worse for their experience and were discharged the next day.

There is not the slightest doubt that the bottom manlid of the still saved the lives of the four men concerned. It would have been impossible to remove four unconscious men through the top manhole of the still before it was too late.

With regard to the use of breathing apparatus and lifebelts in stills which are not free from gas, there are a number of excellent devices on the market for the purpose. One of these should be kept in every tar works for use in emergency. The class of apparatus which supplies air to the helmet from an outside bellows or pump are to be preferred to those face masks which depend on inhalation for the supply of air.

* From a paper at the Chemical Session, National "Safety First" Week, Leeds.

EDUCATION . . . . FOR SALESMANSHIP

We conclude our extracts from the Final Report of the Government Committee on Education for Salesmanship, of which Sir Francis Goodenough, C.B.E., was Chairman. Previous extracts were published in the "JOURNAL" last week.*

Main Conclusions and Recommendations.

PREFATORY NOTES.

We would preface our Conclusions and Recommendations by saying that we believe that much can be done, in the words of our terms of reference, "for the promotion by means of education of greater efficiency in the marketing of British goods and services, at home and overseas," by the considered development of our existing educational system and commercial organization.

While making numerous recommendations to that end, which are summarized hereunder and call for early consideration and action by employers and educationists alike, we make none which seem to us of a revolutionary character and, we may add, none of a costly nature. Our proposals aim rather at making the most efficient use of existing institutions and at securing to the nation increased value for its present heavy expenditure on education.

In particular, we make no recommendations for the establishment of "forcing houses" for the rapid production of salesmen. We are strong in our unanimous opinion that there is no "short cut" to efficiency in Salesmanship. The successful conduct of commerce, either within or without the business house and whether at home or abroad—such conduct of commerce as will secure the permanent satisfaction and confidence of the customer—calls for knowledge and wisdom derived from considerable experience as well as from sound general education. It calls also for the steady development of suitable personality by suitable education and suitable subsequent training in the principles and technique of commerce; and men and women having such personality, knowledge, wisdom, and technique are not to be produced by any intensive "forcing" process.

Our findings and recommendations call for:

(1) *Recognition by the nation in general and by employers in particular* that the future industrial prosperity of this country depends upon the constant application to the problems of finding, developing, and maintaining markets for British goods and services of at least as much time, thought, and energy, and as high a degree of abilities as are applied to the problems of production and finance; and that success in the solution of these fundamental problems of marketing (or "Salesmanship" in its widest sense) involves the employment in commerce of those possessing the highest qualities alike of character and intellect, developed to the fullest degree by sound education, training, and experience.

(2) *Recognition by all employers* of what has been proved by some—namely, that they can increase their chance of success in the sale of their goods and services and reduce rather than increase their costs of production and marketing:

(*a*) By paying close and very thorough attention to the recruitment of their staff for the commercial side of their business and, with that end in view, making themselves fully acquainted with the present sources of supply of recruits of good quality;

(*b*) by offering prospects, in the near as well as more distant future, that will attract the very best types of recruit for their particular purposes;

(*c*) by realizing that, however naturally gifted a man may be for Salesmanship, his value can be greatly enhanced by—

(i.) a sound general education—for developing in him activity of thought, receptivity to ideas and the capacity to speak and write correctly and acceptably in his own and other languages, as well as for providing him with the essential foundations of a knowledge and understanding of the world;

(ii.) a grasp of the fundamental principles of commerce and of business methods and organization generally; and

(iii.) appropriate instruction and training in respect of his trade, his commodity (*i.e.*, goods or services) and his markets, and the best methods of selling that commodity in those markets;

(*d*) by interesting themselves constantly and thoroughly in the progress of recruits after their entry into business, and in their continued education and training either by their individual firms or through schemes organized by their trade organizations possibly in co-operation with educational institutions;

(*e*) by giving facilities within working hours for special education and training.

On the question of any cost to the employer involved in these propositions it may be said that it is not so much a question of: Can we afford to raise the standard of our commercial personnel? As of: Can we, under to-day's conditions, afford *not* to employ the best we can get?

(3) *Recognition by employers and by associations of employers* that it is their duty, alike to their country, their trade, and their individual business, to show their readiness to co-operate fully with educational authorities for the purpose of ensuring that the educational needs of this mercantile nation are met effectively without detriment to the intellectual and cultural development of its individual citizens.

(4) *Recognition by Educationists* of the importance (*a*) of close and frequent consultation and co-operation with commerce and industry, in order to ensure on the part of the educationist the fullest possible understanding of the qualities of mind and character demanded in those who aspire to careers in business; (*b*) of taking effective steps constantly to keep business men informed of what education is doing and can do for them; and (*c*) of taking all opportunities of familiarizing themselves with the conduct and conditions and needs of those vital parts of the nation's activities which are comprised in the term "business."

(5) *Recognition by Educationists* of the need for reconsideration, so far as may be necessary in the light of this report, of the curricula in the various types of school and college which deal alike with general and with commercial education, and, in some instances, of the orientation of the studies followed in them.

(6) *Recognition by parents and their children* of the attractions of a career in commerce and the possibilities which it offers of service to the community.

(7) *Recognition, by those having the means,* of the opportunity of service to the nation afforded by the need for liberal endowment of facilities for education and for the advancement of knowledge, upon which the successful development of the country's industries and trade must largely depend.

(8) *Recognition by all concerned* of the fact that the problem of the education of those engaged in, or aspiring to enter, commerce is no less important than is education for industry.

Summary.

Our First Interim Report contained ample evidence of the need for the employment in commerce at home and overseas of an increased number of efficient employees and of a better educated and trained personnel generally. We regard both as essential to the maintenance and progress of British trade. We remind employers that they must pay a good price to secure good tools. We believe reasonable expenditure incurred under that heading to be a productive investment, not an addition to costs.

Our Second Interim Report demonstrated the great attention paid to the teaching of modern languages, and the great facility in their use, both by tongue and pen, in certain Continental countries which were specially visited. Our First Interim Report made clear that we were handicapped in overseas trading by our deficiency in this respect.

THE PRESENT REPORT.

FACTORS IN THE PROBLEM OF RECRUITMENT.

There have been important developments during the present century in the structure of business and in the educational system which are insufficiently known to the

* The Report can be obtained from H.M. Stationery Office, price 1s. 6d. net.

educationist and the business man respectively (*e.g.*, there are four secondary school pupils available for employment to-day to one 25 years ago).

This defect in contact is reflected in the practice of recruitment to commerce.

It is of vital importance that all branches of commerce should adopt a systematic recruiting policy, though we recognize the difficulties in the way of doing this. The employer should analyze his needs and make himself familiar with the available supplies. The risks involved in interfering with "vertical promotion" are considerable but not insuperable.

Agencies for recruitment are doing valuable work and deserve the practical sympathy and co-operation of employers. Conditions necessary for their efficiency: There is need for a "careers department" or clearing-house in connection with the Public Schools. The appointment of a "Careers Master" for each school has great advantages.

It is clearly and urgently desirable that all such aids as State, County, and City Scholarships tenable at the Universities should be thrown open to the whole nation and awarded solely on the merits of the candidates.

Great value attaches to school activities which foster the elements of a well-balanced individuality. "Personality" is a great asset to the salesman, but needs the backing of character.

Education for Commerce During Full-Time Schooling.

(*a*) *Public Elementary Schools and Junior Commercial Schools.*

The prime object of the Public Elementary School should be to give a good general education, in which essential subjects are English, Arithmetic, Geography, and History. The value of Elementary Science and of Manual Training is not overlooked.

The criticisms made by our witnesses of the knowledge possessed by young recruits from Elementary Schools deserve attention, particularly in view of the importance of a mastery of fundamental subjects to the development of senior work.

The teaching of Arithmetic should be related to present day facts and local data. Mental Arithmetic should receive considerable attention. The teaching of Geography should have close relation to the commercial and economic life of countries studied.

Any instruction in shorthand and typewriting should be postponed until near the end of school life; should be provided by means of intensive courses; and not be given below the age of 14.

Drawing is of value to the salesman in many trades.

For the purpose of recruitment, employers should be acquainted with the developments in the Elementary School system, and particularly the growth of senior work. They should realize the need for continuative education of recruits from Elementary Schools.

If local conditions justify it, the establishment of Junior Commercial Schools is to be encouraged. These schools should not, as a rule, receive children much below the age of 14, and should provide a course of not less than two years in preparation for office work, or, in a somewhat different type, for retail distribution. We hope that it will be possible to facilitate the transfer of pupils from other schools in suitable cases.

While we make no recommendations as regards Examinations in Senior Elementary and Junior Commercial Schools, we are anxious that the work of the Schools should not be controlled by an unsuitable external examining body of an academic character.

(*b*) *Secondary and Public Schools.*

There has been a marked increase in recruitment to commerce from Secondary Schools, and in general employers appear to be satisfied, though there is some criticism of attainments comparable with that relating to Elementary Schools.

The object of the Secondary School is to give a good general education, and we are anxious that the best possible instruction should be given in English, Mathematics (including Arithmetic), Science, Geography, History, and Modern Languages. The three last named subjects can usefully be related. Teachers should make use of Reports of the Department of Overseas Trade.

The planning of work for pupils of 16-18 years of age in Secondary Schools is of great interest. Pupils of 18 are not "too old" to start in Commerce, if the years 16-18 have been spent wisely at school. Some degree of specialization during that period is justified. Shorthand, typewriting, and instruction in "commodities" are inappropriate at this stage, but a "Modern Studies" course including descriptive economics, accounts, and statistics, would be very useful in certain schools.

Recruitment to commerce from the Public Schools is comparatively small, but increasing. Public School boys are promising recruits for the higher ranks of commerce, if wisely selected. It is very important that recruitment from this source should be made only with full regard to the character and organization of the business and the temperament and personality of the recruits.

Similar considerations apply to instruction in Public Schools as to advanced work in Secondary Schools.

Some employers place undue value upon the possession of certificates and do not realize the importance of obtaining from the teacher information as to the qualities and abilities of candidates. The danger of this attitude is that it encourages cramming at the expense of sound education.

Educationists must consider whether our recommendations involve any change in the form or content of the First and Second School Examinations, but in any case we consider that (*a*) the First School Examination should be one which a diligent pupil of average intelligence can take in his stride, no "credits" or "distinctions" being awarded; (*b*) an effective oral test is essential in Modern Language Examinations, and (*c*) the association of the First Examination with Matriculation is objectionable. Commerce needs boys who have been efficiently educated according to their natural bent.

The prospects of a decent livelihood at a reasonably early age are essential to attract the majority of well-educated recruits of 18 or 19 years of age. Such recruits should not be started at the same point and put through precisely the same stages of training as recruits of 14 or 16. These points deserve the serious attention of employers.

(*c*) *Technical Schools and Colleges and Universities.*

Full-time Commercial Colleges are established in the great commercial centres. The establishment of full-time commercial courses should not be undertaken unless there are reasonable prospects of suitable employment for the students in the ranks of commerce; but we desire to see such courses developed either in Secondary Schools or in Commercial Colleges, as may be appropriate. We lay stress on the importance of these courses not leading prematurely to specialization for commerce. Such courses in Secondary Schools should have the same status as other advanced courses.

Such difficulties as attend recruitment from the Universities (and Public Schools) would be greatly reduced by the engagement of graduates as "pupil salesmen" or "pupil representatives."

It is essential that graduates should not be recruited unless the character and organization of the business and the personality of the recruits are suitable.

The specific contribution which the Universities can make to Commerce is by supplying recruits with a knowledge of life and wide intellectual and social sympathies.

University Courses taken by undergraduates who propose eventually to enter commerce should be of an Honours standard and it is essential that the students should not be forced to follow uncongenial lines of study.

We commend to the attention both of University Authorities and business organizations the question of securing closer contact between University Faculties of Commerce and the business world.

Reference is made to experiments in the training of business executives and of those engaged on the commercial side in the coal industry.

(*d*) *Selection of Recruits and Other General Questions.*

The developments in the educational system accentuate the need for the employer to be acquainted with that system so as to evolve a sound method of selection.

The problem of selection is also complicated by the growing mechanization of office work, and can only be solved by the close co-operation of parents, teachers, and employers. It would be useful if young persons leaving elementary schools possessed standardized school records.

Vocational tests with proper safeguards may be developed as a valuable aid to selection, and the question of the use of examination results is conditioned by what is previously said.

In connection with selection, we refer to the appointment of Staff Managers in large businesses.

Education and Training During Employment.

(*a*) *General.*

It is comparatively rare for the training given by firms to be related to the instruction in part-time schools and this matter needs urgent consideration. Where special courses have been arranged to meet the requirements of firms the results have been very successful. Education for Commerce is less developed than Education for Industry: a state of things that must not be permitted to continue.

A general scheme of training by firms cannot be framed, but it is broadly true that the salesman should have an

adequate knowledge of the organization of his firm and of the commodities and market with which he is concerned.

Salesmen should not be left to " pick-up " essential skill and knowledge.

(b) Instruction Relating to the Commodity.

Generally speaking, the knowledge required by the salesman in the case of standardized goods is less intimate than that required by the producer and is primarily concerned with the value of the article and how it works. The knowledge he needs can sometimes be gained by special instructions given by the employer, possibly supplemented by a school course.

For unstandardized goods the question whether the salesman must be trained as a producer depends on the type of commodity concerned, but he must know how the goods behave in use and what modifications can be made in them to meet particular purposes. The technical school can provide useful courses of instruction in commodities in practically all cases.

(c) The Training of the Salesman in Business.

The most common method of training by the firm of which we received evidence is the organization of the work of the recruit so as to give him opportunities for acquiring the knowledge desired.

Other methods adopted are the observation of qualified salesmen and selling under supervision. Comparatively few firms provide organized instruction, and we strongly emphasize the importance of developing sound methods of training.

The training of salesmen for work overseas is of the greatest importance, but definite schemes are rare except among merchanting firms. We commend the training arrangements made by prominent exporting firms as examples to other firms who wish to develop an overseas trade.

(d) School Instruction in Commercial Subjects.

Attention is directed to the present provision for part-time instruction in commercial subjects.

(e) The Further Development of Part-Time Commercial Education.

The co-operation between the schools and commercial interests should be strengthened by such methods as extending the arrangements for advisory committees and co-opting business men on the Governing Bodies of Technical and Commercial Schools. We also hope that central and local business organizations will increasingly establish contact with the Board of Education and Local Education Authorities with a view to the initiation of educational schemes.

We consider it desirable that, in every important industrial region, the Local Education Authorities concerned should establish joint committees for planning schemes of vocational work.

It is very rare for commercial employees to be allowed time off to attend day classes. We recommend that the possibility of doing this or of releasing employees for short intensive courses should be seriously considered by all firms which attach importance to the training of their staffs.

We consider it desirable that all employees should understand something of the internal organization of their firm and its relations with the outside world. We recommend that employers should co-operate with educational authorities with a view to the establishment of classes for persons engaged in particular local industries or concerned with particular commodities.

We recommend that trade associations should consider their educational needs in connection with the possibility of establishing short intensive courses for employees of suitable experience.

Employees who are likely to be sent overseas should be given facilities by their employers for learning foreign languages abroad.

We heartily commend the scholarship schemes for commercial students already established.

We consider that courses in (*a*) the principles of trading; and (*b*) the art of selling, can with certain safeguards be of value for experienced students, and it is important that every trade should consider with the appropriate educational authorities the possibility of establishing such courses.

(f) Examinations for Part-Time Students of Commerce.

An effective examination scheme for part-time students is necessary provided that care is taken to prevent certificates becoming the ideal of the commercial employee.

We consider that a scheme of certification for commercial students is desirable in substitution for the present unsatisfactory examination arrangements.

We are, however, of opinion that the scheme should be confined for the present to advanced students of suitable qualifications and of at least 21 years of age.

MATTERS COMMON TO ALL TYPES OF EDUCATION.

(a) Modern Languages.

We consider that generally speaking there are deficiencies in modern language instruction in this country due partly to public indifference, partly to over-emphasis of the literary as distinct from the spoken language, and partly to inadequate provision for German and Spanish.

(b) Commerce and Education in Art.

It is of great importance that a careful study should be made of the artistic tastes of customers.

Buyers and salesmen may be trained to appreciate art values; and courses already provided in some Art Schools for this purpose might be extended. The practice of sending employees in some trades to attend auctions and other sales is useful.

Every effort should be made through the medium of full-time schools to improve the general standard of taste of the public.

(c) Retail Trade and the Home Market.

Retail trade presents special features and the importance of the personal relations between salesman and customer is particularly obvious.

(d) Material Aids to the Teaching of Commercial Subjects.

It is very important that all public libraries should contain a good commercial section and commercial colleges and schools should be well equipped with libraries. We recommend that the possibility of supplying such libraries with suitable Government publications at special rates should be favourably considered.

Attention is directed to the importance of adequate equipment for geography teaching and of careful provision for practical instruction in commodities.

Close relations should be maintained between Museum and Art Gallery authorities, education authorities, and the business associations of firms which are interested.

(e) The Training of Teachers.

The problem of the training of commercial teachers is largely that of giving teaching skill to persons with experience of commerce and commercial experience to professional teachers.

We attach great importance to the provision made by the Board of Education and Local Education Authorities for short courses for commercial teachers, and we consider that all possible facilities should be given to such teachers to acquire and retain up-to-date knowledge of business practice.

We hope that the foregoing conclusions and recommendations will receive the early attention and full consideration alike of the Educational Authorities and of all the organizations of commerce and industry throughout the country. We regard the question of securing improved personnel for the service of British trade at home and abroad as one of urgent importance.

THE "JOURNAL" TECHNICAL RECORD

Which contains Full Reports of Meetings of Gas and Allied Associations

Irish Association of Gas Managers

THIRTY-NINTH ANNUAL GENERAL MEETING

Londonderry, whose history goes back to very early times, and whose fame will last for as many years to come, was, as the home of the President, selected for the thirty-ninth annual general meeting of the Irish Association of Gas Managers; and an excellent choice it proved to be. Heroic in times of war, the citizens are no less distinguished in times of peace, when their hospitality to visitors is such as to make an indelible impression upon those who are fortunate enough to enjoy it. Derry, as the city is popularly called, is a place of industrial importance, but no undertaking there is more important or more esteemed than the Gas Company, whose Engineer, Manager, and Secretary (Mr. George Walmsley) presided over the meeting. The business proceedings took place in the magnificent Guildhall, which was rebuilt some twenty years ago, and which contains an organ reckoned to be among the finest of its class in the British Isles. Upon this organ Mr. J. P. Whimster played delightfully several times during the stay in Derry, to the great enjoyment of the members and friends.

When the meeting was called to order, there were upon the platform supporting the President the Mayor (Senator D. E. B. M'Corkell, D.L.), the High Sheriff (Sir Basil M'Farland), the Chairman of the Gas Company (Mr. R. Smyth, D.L.), and Mr. J. H. Canning (President of the Institution of Gas Engineers). Mr. J. W. McLusky, of Glasgow, was also present.

The PRESIDENT said he believed it was the first time in the history of the Irish Association that the President of the parent Institution had been present at one of their meetings, and they were deeply grateful to Mr. Canning for having taken so long a journey in order to be with them that day—particularly in view of the fact that he was about to proceed to Canada and the United States to represent the Gas Industry of the British Isles.

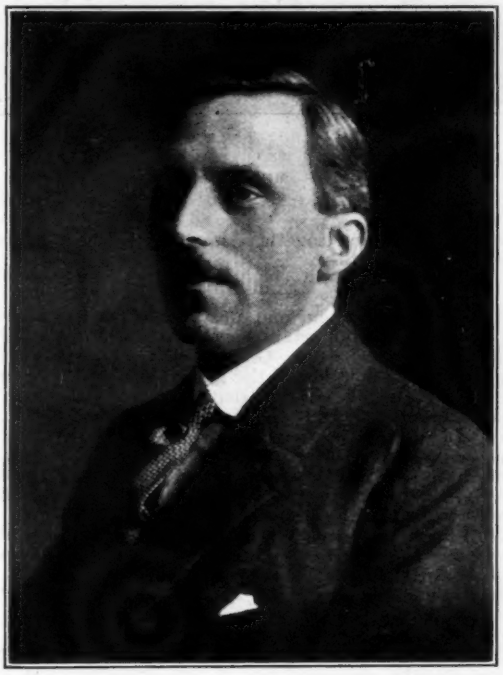
The MAYOR briefly welcomed the members, remarking that Mr. Walmsley was a citizen of whom they were all proud. The Association were to be congratulated upon having chosen him to occupy the chair.

PRESIDENTIAL ADDRESS.

The PRESIDENT then delivered his address, which was reproduced in last week's issue of the "JOURNAL."

Mr. L. G. YOUNG (Carlow) proposed a hearty vote of thanks to the President for his address, which he said would be of great value to the members.

Mr. J. H. CANNING said that, before formally seconding the vote, he would like to thank the Association for their kindness in inviting him to the meeting. He had had a long journey, but the cordiality of the welcome had been more than ample recompense. The President had admirably summarized the position of the Gas Industry in Ireland, particularly in relation to the electrical competition which it had to meet. He felt quite certain that the Governments of both Great Britain and the Irish Free State must, in the matter of electricity development, be both sadder and wiser, and that if they had their chances over again would be far less eager to dabble in things they did not understand. Reference had also been made to the question of public lighting, and in this connection he did feel very strongly that they must make every possible effort to secure their position. In September there was to be an International Illumination Congress on the other side of the channel, and he urged everyone who possibly could to go over and support the Gas Industry in the campaign that was being arranged to show the public what gas could do. The Congress would be visiting both England and Scotland, and he thought they might also have arranged to visit Ireland. He was told that he was the first President of the Institution of Gas Engineers who, during his year of office, had been present at a meeting of the Irish Association. He regarded this as a great distinction. He was present largely on account of the desire to tighten the bonds connecting the Parent Institution with the District Associations. It would be recalled that a short time ago the Institution appealed to certain district bodies which bore the name of "Institution" to adopt the title of "Association." This was done largely with a view to binding them all closer together, and so enabling them to co-operate more thoroughly. There was a time when—in the absence of competition, and of the other difficulties with which they were confronted to-day—if anything adverse happened to the Gas Industry (say) in Scotland or Ireland, the man in London could shrug his shoulders, and say: "That is a long way off, and it does not concern me." Those days had gone completely, and they



THE PRESIDENT,

G. WALMSLEY, of Londonderry.

Mr. Walmsley commenced his career in the Gas Industry at Ilkley (Yorks.) under the then Engineer, Mr. Wm. Everitt, under whose tuition he obtained First-Class Honours in the City and Guilds of London Institute Examinations in Gas Engineering and Distribution. He was a student at Bradford Technical College and Leeds University, and was one of the original members of the Yorkshire Junior Gas Association. Subsequently Mr. Walmsley became Assistant at Cleethorpes, and for the past 19 years has been with his present Company at Londonderry, being appointed Engineer and General Manager in 1924. He now holds the appointment of Engineer, Manager, and Secretary.

[*Photo. by Londonderry Standard.*

GROUP OF MEMBERS AND FRIENDS OF THE IRISH ASSOCIATION OF GAS MANAGERS OUTSIDE LONDONDERRY GUILDHALL.

must now all stand together, in order to meet the problems which faced them.

Education.

He appealed to them one and all for their co-operation in helping on the important work undertaken by the Institution of Gas Engineers. One of the most vital considerations was the education of the gas engineers of the future. The future of the Industry depended upon the men who were trained to make it their profession, and therefore he considered the Education Scheme to be one of the most important tasks to which they could put their hands; and it was a work which only the Institution of Gas Engineers was competent to carry out. Further, they wanted to enhance the status and dignity of the Industry, which must depend upon education. He urged the members to do all they could to assist in this work. By doing so they would be promoting the best interests of the Industry which they had so much at heart.

He had great pleasure in seconding the vote of thanks to the President.

The President, in the course of his acknowledgment, expressed the gratification of the members at being honoured by the presence of the President of the Institution of Gas Engineers.

President's Medal

Mr. Canning said he had now been asked to perform a very pleasant duty. It was the custom of the Association to present to each outgoing President a medal, as a memento of his year of office. In the absence of the Past-President, he handed the medal to Mr. Walmsley, with the hope that it would bring him many happy memories. Mr. Walmsley had had a very successful year, and had fully maintained the traditions of the Association.

Committee's Report and Accounts.

The Hon. Secretary and Treasurer (Mr. George Airth, of Dundalk) read the following report of the Committee:

Your Committee have pleasure in recording that the meeting in Dublin last year was well attended. The President's Address was much appreciated, and the papers given by Mr. Young and Mr. McIntyre caused a very hearty and valuable discussion. Unfortunately the weather was very much against us on the day of the excursion. However, dancing, a whist drive, and a concert passed away the time and all seemed to enjoy the outing.

The general depression in trade and commerce all over the world has undoubtedly had a bad effect on our efforts; but so far as can be seen it has hit our competitors quite as badly as it has hit us, and now that we know the competition that we have to meet all over Ireland, the Committee feel sure that the members will put forth every effort to stem the invader and keep the flag of gas still at the top of the mast.

The number of ballot papers sent in this year is 36, and you are reminded that if the names nominated do not meet with your approval you may nominate others for yourselves. The Committee suggest that every member should vote, not about 41 p.ct.

The balance to credit in the Treasurer's hands this year is £79 0s. 5d., as compared with £61 16s. 2d. in 1930.

The Auditor (Mr. L. P. Phillips, of Dublin) presented the accounts.

Mr. T. N. Walsh (Navan), in connection with the nomination of officers, asked whether it would not be better to alter the existing system. Year after year the outgoing Committee nominated their successors. He urged that the Committee should be made as wide as possible.

Mr. Airth pointed out that it was open to the members to vote according to the recommendations of the Committee, or to substitute any other names. He had been Secretary for 25 years, and in that time he had had only one outside nomination for the Committee, and that one name was sent in after the ballot-papers had been despatched.

The President said Mr. Walsh seemed to think that the appointment of the Committee should be left in the hands of the whole of the members at the general meeting, but this would involve the waste of a great deal of valuable time. The outgoing Committee therefore put forward certain recommendations, and they endeavoured to make a fair allocation between the different parts of the country. Therefore he could not see the force of Mr. Walsh's remarks.

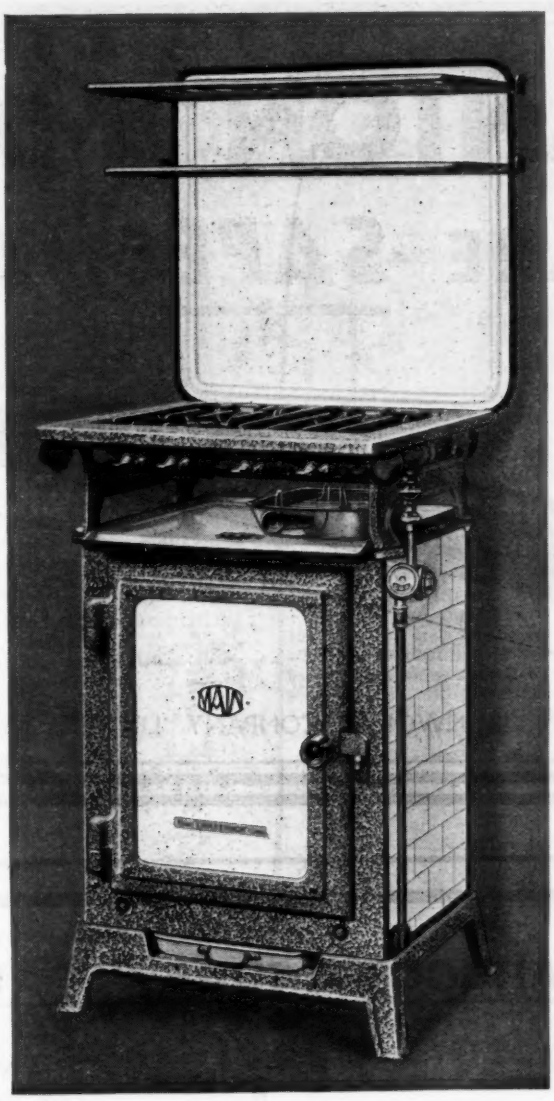
Mr. F. J. Edmonds (Waterford) thought the point raised might be considered, and then, if it seemed desirable to do so, it could be brought forward again at a future meeting. At the moment, it was out of order.

Mr. L. G. Young (Carlow) expressed the opinion that Mr. Walsh's wishes were sufficiently met under the existing arrangements.

Mr. J. M'Nicholl (Cork) remarked that, so far as his own observation went, the difficulty was to get men to serve on the Committee. If the members would take more interest in the activities of the Association, it would be all to the good.

Mr. J. A. Pemberton (Sligo) suggested that the matter should be brought up at the next meeting. If there was anything in the point, he was sure that a satisfactory solution would then be presented.

Mr. Airth explained that the present system was adopted to economize time. If anyone desired a particular name to be put forward, it was only necessary to write to him.



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Any name so received before the end of March in each year would go forward for consideration.

Mr. WALSH said this was agreeable to him, and he moved the adoption of the Committee's report.

Mr. J. A. ROONEY (Drogheda) seconded this, and it was unanimously agreed to.

OFFICERS FOR 1931-32.

The Scrutineers who were appointed to go through the ballot papers (Messrs. J. Oxley, London, and W. Steel, Dublin) subsequently reported the election of the following officers for the ensuing twelve months:

President.—Mr. L. G. Young, Carlow.
Vice-President.—Mr. F. J. Edmonds, Waterford.
Members of Committee.—Messrs. W. H. Roberts, Donaghadee; T. Burke, Malahide; A. Kirkham, Enniscorthy.
Auditor.—Mr. L. P. Phillips, Dublin.
Hon. Secretary and Treasurer.—Mr. G. Airth, Dundalk.

NEW MEMBERS.

The following additions were made to the membership of the Association:

Ordinary Members.—Messrs. J. P. MacIlwaine, Newtownards; John W. Young, Queenstown; W. A. Toghill, Belfast.
Extraordinary Members.—Messrs. S. Hall, Leith; A. P. Main, Glasgow; J. Douglas Allen, Carlisle.

REPRESENTATIVE ON THE INSTITUTION COUNCIL.

On the proposition of Mr. H. W. SAVILLE (Wexford), seconded by Mr. J. M'NICHOLL (Cork), the President was elected to represent the Association on the Council of the Institution of Gas Engineers.

TAR FIRING OF RETORTS.

By W. E. YOUNG, Manager and Secretary to the Cobh (Queenstown) Gas Company.

In presenting to you these few observations on tar firing of retorts I am not laying before you anything original, or indeed novel, but just a brief record of what has been done in Queenstown to make use of tar to heat the retorts, tar having become rather valueless.

Let me at once state that I have found for all practical purposes that 100 gallons of tar liberates for sale approximately 1 ton of coke, so whether it will pay to use tar or coke depends on the relative price one obtains for each.

I use tar for heating a bed of 7 retorts, and require 100 gallons per 24 hours to maintain satisfactory heats. These retorts were arranged for coke firing (regenerative), with a loose lid charging door. This bed has done considerable service as a coke-fired setting, and, on converting to tar firing, I removed the producer arch, but where there is an ample size combustion chamber I do not think it is really necessary to use the producer at all, but simply to inject the tar into the combustion chamber through a suitable opening made in the wall. Of that I am expressing an opinion only.

METHOD OF INJECTING TAR.

I inject the tar by steam pressure into the producer (this I have filled three parts up with broken bricks). No air is admitted at the bottom door, but sufficient to consume the tar is admitted with the tar spray at the charging-door. This adjustment is not highly critical, and can easily be arrived at when the tar injector is working. I am using as a tar injector, or tar spray (call it what you will), an old "Buffalo" steam injector.

The steam nozzle has been reduced to $\frac{1}{16}$ in. diameter, while the venturi tube has been increased to $\frac{3}{8}$ in. diameter. A steam pressure of from 30 lbs. up is preferred, and if the injector is working properly there should be a very definite suction on the tar supply pipe.

The tar is pumped up to an overhead tank and allowed to gravitate to another tank of about 80 gallons capacity, which is placed just below the former. The level of the tar should be maintained within reasonable limits in this second tank, and the contents are brought to, and kept at, boiling point by a steam coil in the tank. Very little steam is required to keep the tar hot.

The tar next passes to the filter (fig. 1), thence through a regulating nipple—preferably made of steel—and into the

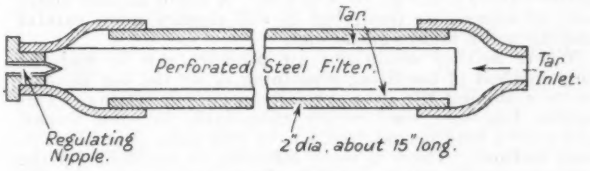


Fig. 1.—Filter for Use with Tar Firing.

funnel on top of the tar supply pipe. There is quite a considerable quantity of air sucked in, and the mixture is finally injected in a fine spray into the producer, and results in an intensely hot flame of dazzling brilliancy of about 4 or 5 ft. long. This flame is directed straight into the combustion chamber, but at the same time care is taken that the flame does not impinge on any brick-work, as this would result in a rapid deposition of carbon. I have not found any destructive cutting heat in the setting, although the heat maintained on the retorts is really excellent.

ANOTHER TYPE OF INJECTOR.

I have been conducting experiments with another type of injector similar in construction to the blow-through jet as used in optical limelight work. I have with me a specimen of this jet. One advantage of the jet is that a much lower steam pressure will suffice, several pounds only being sufficient. You will note from the sketch submitted (fig. 2)

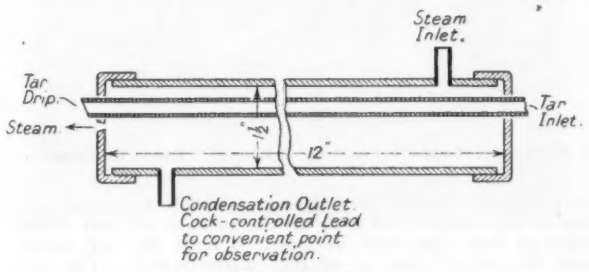


Fig. 2.—Tar Injector.

that the tar is in intimate contact with the steam pipe right up to the point of injection.

At the time of writing my test is not complete. Con-

sidering the greater efficiency of the mixed jet as used in optical work (to which the " Buffalo " injector I use can be likened) as compared with the blow-through type, to which the latter is akin, it remains to be seen which will be the best to use.

Simplicity of Operation.

As regards attention, provided the tar is of reasonable quality, that is to say, not scummy as it is when pumped from the surface of the wells, then the injector can easily operate for 8 hours without any attention whatever, and has often run for three days. It is a great boon to the stoker, there being no furnace to clinker. The cleaning of the filter is easily performed, only two or three minutes occasionally. After two or three weeks' working, the tar injector needs attention, but it can be taken apart and readily cleaned.

On the matter of filters, I have found perforated steel plate the best from all aspects to use for the filter. It is much stronger than gauze, is more readily cleaned, and, what is most important, goes much longer without cleaning than a gauze filter. As regards the adjustment of the air admitted with the spray, those having the Orsat apparatus can, of course, take samples of the waste gases at the main outlet of the setting; but a ready means of determining the admission is so to adjust the air that a trace of smoke only can be observed issuing from the chimney. Any more than a trace indicates the use of too much tar and too little air.

Tar Consumption.

For satisfactory working of my bed I have to use, as before stated, 100 gallons over 24 hours; but I know there are other managers using a similar arrangement to Queenstown who have got their tar consumption (in a smaller bed) down to 60 gallons per 24 hours.

The fact that steam is required for injecting the tar is perhaps fatal to its adoption in many small works, but it might be observed that air pressure could be used instead. That would mean the provision of an air-pump of sorts, and some means of heating the tar, though I know one manager who prefers to use the tar cold; but that is certainly not my experience. For steam raising a fairly large boiler is better—(say) 8 or 9 ft. by 4 or 5 ft. A much smaller boiler can, of course, be used, but it will require more careful stoking and a higher grade fuel.

Where neither steam nor air pressure can be had the only method of tar firing remaining is for the tar to drop on to a sloping tile in a specially prepared setting. This system has been used rather extensively in some works, and over a long period, and I have had some experience in that method. There is some difficulty in breaking up the tar into spray, and in order to do so it is usual to let the tar drop on to an irregular substance such as a piece of clinker.

It is necessary to adjust fairly frequently the position of the clinker to ensure the tar being broken up as minutely as possible.

Lighting Up.

I give herewith a sketch of my tar firing arrangement (fig. 3), and a few observations on lighting up a tar-fired

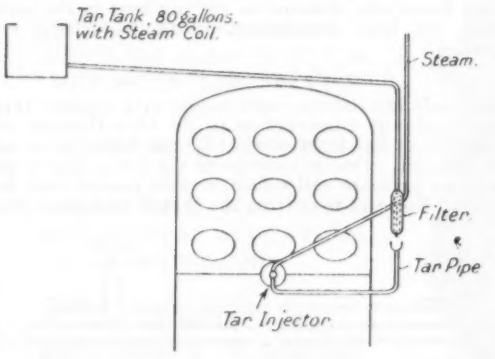


Fig. 3.—Showing Method of Tar Firing of Retorts in Use at Queenstown.

bed might be worth while. I have generally put some hot coke in the producer to heat up the brick-work, but when sufficient heat has been obtained to light the tar spray then the use of coke is entirely discontinued. The tar flame very quickly heats up the surrounding brick-work. Where the drip system is in use it is necessary to heat up to a bright red the tile on which the tar is sprayed.

Success in tar firing can only be obtained by maintaining a regular flow of tar to the injector. Some system of filtration is necessary to secure that end. I have endeavoured briefly to describe what is being done in Queenstown. I reiterate that I do not make any claim that the system described is original or novel, or that it is the best.

Discussion.

The President expressed the indebtedness of the members to Mr. Young for coming forward with just the sort of paper the members desired to have. It was a paper which would appeal to the great majority of them. It would be helpful to managers of small works to utilize their tar, which in many cases they were practically giving away—particularly if it would enable them to release a certain amount of coke, and so show a good balance on the credit side. To his mind, the snag of tar firing might be the choking of the tar injector. He had had experience many years ago of injecting tar under boilers, and this choking was the trouble. The author had, however, got over this trouble very well.

The Question of Imported Material.

Mr. J. M'Nicholl (Cork) remarked that the problem of what to do with their tar was a really pressing one to-day. It seemed rather peculiar that in a country like Ireland it should be regarded as necessary to import so large a quantity of materials for the roads, when they had their own tar which could be used. As a matter of fact, they did not make sufficient tar for the whole of the roads; they must import some material. Even in England, however, where they had more than sufficient for the roads, they still continued to import foreign material. Mr. Young did not give his reason for adopting tar; but doubtless the principal one was that he could not dispose of it satisfactorily otherwise. The point, of course, was whether he was doing better by burning his tar than by selling it. It was very inadvisable to sell crude tar for the roads; but it might be possible to sell it to a distiller. At present the price of road tar might be reckoned at something like 4d. per gallon net; and when one took into consideration the cost of distillation and preparation of road tars, and transport charges, there would be very little left as the price for crude tar. From what Mr. Young had said, he gathered that 1 ton of tar was practically equal to 2 tons of coke as fuel. If he got (say) 30s. per ton for coke—and probably he would get that in Queenstown—it meant £3 per ton for tar, and if he was getting £3 per ton for crude tar, he was doing very well. [" Hear, hear."] He was of opinion that Mr. Young would have many imitators—that was, if his figures were correct. A figure of £3 per ton represented about 3½d. per gallon. The author said that the tar was kept at boiling point before passing to the injector. How did he manage in the first instance to bring the tar to boiling point, and then to maintain it at that point, without losing much of the light products?

Labour-Saving Possibilities.

Mr. F. J. Edmonds (Waterford) said that, seeing Mr. Young had been able to get over the difficulty of straining his tar and having an uninterrupted burner, it seemed that there was a very great possibility of labour saving in the system, and that to-day, in a small works, was something to be taken into consideration. It would be doing away with a tremendous amount of hard work. One would eliminate cleaning and clinkering of the producers, and charging also. He believed in some cases it was the custom to remove the two centre retorts. Otherwise there might be difficulty in using an ordinary setting for tar, unless one had a very deep producer.

Reminiscences.

Mr. J. H. Canning agreed with Mr. M'Nicholl that it was a great pity a remunerative outlet for tar could not be found in that country. Road surveyors were, however, coming round to the opinion that for road purposes tar possessed a value which no substitute could give. The author had done great service to the Association by bringing forward a paper of such a character. It was one which called back to his (Mr. Canning's) mind some very old reminiscences. He remembered when a small boy overhearing conversations between his father and professional colleagues. At that period he believed the price of tar was so low that they were faced with this problem in England, and were burning tar in direct-fired settings, by making a hole above the furnace, inserting a piece of angle iron, and allowing the tar to drop down. Then arose the great difficulty of local heating. The only experience he had had personally of tar firing was the use of carburetted water gas tar in connection with Cornish boilers. They were then faced with two difficulties. The first was unequal expansion of the tubes, which often led to leakage; and the second was the dense smoke formed. Finally, the latter became such a nuisance that they were very glad to dispose of the tar in other ways. He noticed the author said he used tar for heating a bed of seven retorts, and then he showed the application of the system to a bed of nine retorts. Was the latter actual practice, because if so the same problem of local heating might arise? Were they through or stop-end retorts? With regard to the relative values of coke and tar for firing, he had a recollection that they used to consider 1 ton of oil tar was equivalent to 3 tons of coal; but the conditions with retorts and boilers were so different that it would be very difficult to make a fair comparison.

Use of Cold Tar

Mr. T. J. Reid (Ballina) remarked that many managers of small works had experimented with the use of tar for heating retorts. Mr. Young was to be congratulated upon having over-

come the obvious objections which tar burning had presented to most of them. At present the disposal of tar was a question which seriously agitated the minds of many. The problem was not what should be done with it, but what could be done with it. The storage capacity in most of their works was very limited, and many managers would be glad indeed if they could dispose of the tar in any way. Not every gas-works was possessed of

means of steam for injecting the tar, which seemed to have overcome the objections to the process; but the author referred to one manager who preferred to use the tar cold. Could he tell them the reasons for this preference? If the reasons were sound, it would be very beneficial to them to know what they were.

Mr. D. M. H. MacLeay (Manchester) spoke to having visited the works at Queenstown, and said he did not think that tar firing need present any very great difficulties.

Mr. L. G. Young (Carlow) said that a good many years ago he went into this question. He had a tank above the setting, and that warmed the tar. If one had a thin tar it was all right, but with a thick tar things were not so easy.

Mr. W. Reid (Athlone) referred to the use, on a small works, of ordinary coal tar without steaming. For a time the heating was quite good; but afterwards the heating went continuously up and down.

A Pioneer.

The Author, in reply to the discussion, said that, of course, everything depended upon what one could get for tar and what one could get for coke. He reckoned that tar at 3½d. per gallon was equal to coke at 35s. per ton; and if he could get 4d. per gallon, he would certainly sell it. On the other hand, if he could get more than 35s. per ton for coke, and less than 3½d. per gallon for tar, then he would burn the tar. His reason for using tar was a monetary one; he could not sell it to advantage, inasmuch as he was unable to obtain more than 1½d. per gallon for it. Tar firing meant a big saving in labour to them.

There was a certain amount of local heating, and it would not be wise to have a centre retort right down on the combustion chamber. It would be better to do away with that retort, and give plenty of space for the flame. So far he had had no experience of tar firing under boilers, but he would certainly try it under his boiler now. His retorts were 12 ft. long, and he had only seven in his bed. There was a manual machine for discharging; the charging being done by hand. Mr. W. Reid, of Longford, was a pioneer in tar firing, and great honour was due to him for the investigations he undertook more than thirty years ago. Personally, he (Mr. Young) was all for heating tar. Possibly he did drive off some of the light oils, but he thought it was only a small amount which they could well afford to ignore.

At the Gas-Works.

The business of the meeting concluded, members and friends were conveyed by motor coach to the gas-works, where they were met by the President, who was again supported by his Chairman; and after refreshments there was a tour of the works, the arrangement and spaciousness of which were much admired. As the plant was described in some detail by Mr. Walmsley in his address, there is no need to make further reference to it here. It was in the grounds at the works that the official photographic group was taken.

N.G.C. and B.C.G.A.

Following the visit to the works, the annual meetings of the members of the National Gas Council and British Commercial Gas Association were held in the Melville Hotel. In the absence of Mr. W. J. Grey (Dublin), the chair was taken by Mr. Walmsley.

After the conclusion of the formal business, relating to the election of representatives on the Committees of the two bodies, the members went into private session, during

which Mr. Fottrell and Mr. Walker delivered addresses, on matters affecting the work of policy of the N.G.C. and the B.C.G.A. respectively.

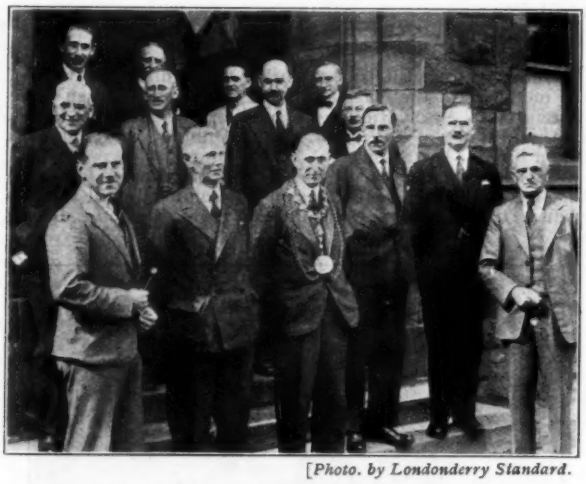
Mr. E. J. Fottrell reviewed the position with regard to the National Gas Council's efforts to secure freedom for the industry from existing parliamentary restrictions. Referring to the question of competition, Mr. Fottrell stressed the importance of the necessity for revision in the method of charge for gas, which, in his opinion, was essential to the future development of the Industry. He commented upon the action which the Council had taken in regard to the proposed adoption of the "unit" and pointed out that, while obviously the matter was one for consideration of each individual undertaking, the Council was most anxious that, as far as possible, uniformity of action should be secured. Any serious variation in the standard of the "unit" adopted by undertakings in various parts of the country would lead to chaos and confusion. In conclusion, he alluded to the forthcoming issue of the report of the Gas Charges Committee, and recommended the members of the Council to study this and other reports which were already published on the subject of gas charges.

Mr. J. M'Nicholl (Cork) took the chair for the B.C.G.A. meeting which followed.

Mr. J. C. Walker addressed the meeting with particular reference to the questions of district publicity and the B.C.G.A. Domestic Gas Salesman's education course. He emphasized the practical character of the course and its value to the Industry generally in improving the standard of selling technique. It was a scheme from which the small

undertakings derived equal benefit with the large undertakings.

An interesting discussion followed, in the course of which Mr. F. J. EDMONDS (Waterford) stated that he had taken up the course, and was in complete agreement with all that Mr. Walker had said about it. He strongly urged his fellow managers in Ireland to give the scheme their most careful thought, as he was confident that it would have an important bearing upon future sales development in the industry.



[*Photo. by Londonderry Standard.*

The President with the Mayor and Other Guests.

A vote of thanks to Mr. Fottrell and Mr. Walker concluded the meetings.

GUESTS OF THE GAS COMPANY.

In the evening, the members, with their ladies and friends, were the guests of the Londonderry Gas Light Company at dinner in the Guildhall. The function was a brilliant one, and will be long remembered by the 115 persons who participated. The function was additionally impressive from the fact that it took place on the eve of the 242nd anniversary of the Relief of Derry—that ever-memorable day when the gallant Captain Browning was killed in action, but on which his ship, the "Mountjoy," broke the boom that had been placed across the harbour mouth, and brought succour to the sorely tried garrison who had been beleagured for a period of about eight months. Derry remains a Maiden City, and retains that spirit which marked it in those times of trial. It has not forgotten the good deeds of bygone days—thus manifesting a large heartedness of which, indeed, the Association had ample evidence during the meeting. The Company proved themselves most generous hosts, but more than this they desired that all through it should be regarded as Mr. Walmsley's "day," and not theirs. This shows a relationship between Engineer and Board which it is a positive delight to record.

The PRESIDENT was in the chair, and proposed the toast of "The King." Afterwards there were some excellent speeches interspersed with thoroughly enjoyable musical items. Before the singing of "God Save the King," the Relief Celebrations had begun, by the discharge of cannon from the city ramparts at midnight.

A JUNIOR ASSOCIATION FOR IRELAND?

Mr. J. M'NICHOLL (Cork), proposing "The Gas Industry and Kindred Associations," said that they as an Association were very much indebted to other organizations. Unfortunately, though they were honoured by the presence of representatives of national bodies, they had with them no representative of the Junior Associations; and it was still more unfortunate that they had no Junior Associations in that country. When they studied the Technical Press week by week, they all recognized the debt they owed to the Junior Associations on the other side of the Channel. These bodies provided excellent fare, and he hoped they would soon have a similar body or bodies in Ireland. ["Hear, hear."] In connection with any Junior Association, they should also have a Salesmen's Circle. The toast was coupled with the names of Mr. Canning, Mr. Fottrell, and Mr. Walker.

Mr. J. H. CANNING, replying, said he was glad to think that the Institution of Gas Engineers stood so high in the estimation of the Association. He had been told before he came over that the Irish Association was a very happy family, and he congratulated them upon this fact. The Gas Industry, he thought, might look forward with quiet confidence to the future. It had made great progress within the last few years, and he was anticipating still greater progress. When they considered the position of the Gas Industry at the beginning of the war, they had reason to be pleased with the change that had since taken place. They in the Gas Industry had not been dependent upon Government help; but if they had had no Government money, they were not subject to Government control. He rather fancied that their competitors would find in the long run that they had paid dearly for the Government subsidies they had received.

AN AGE OF SPECIALISTS.

Mr. E. J. FOTTRELL remarked that to-day they had become a nation of specialists. It was impossible for any professional man successfully to carry on his business by his own unaided efforts. It was absurd of any management of a public utility service to attempt to carry on without specialist assistance. The National Gas Council had endeavoured to aid the engineers in the task with which they were confronted.

Mr. J. C. WALKER said that next year the B.C.G.A. would celebrate their coming of age, and he hoped they would see a very big contingent from Ireland at the annual conference.

Mr. T. J. REID (Ballina) submitted "The Corporation and City of Londonderry." He said that, when one was welcomed as they had been welcomed, it was only right that they should show their appreciation. ["Hear, hear."]

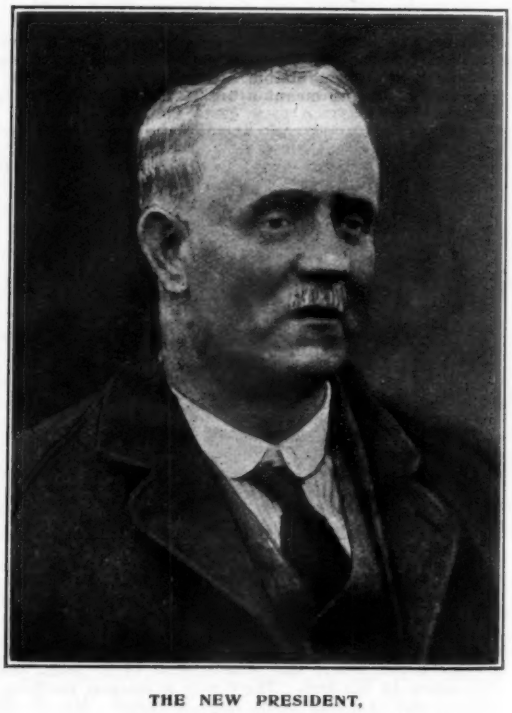
The MAYOR, in response, said his view had been for many years that in any prosperous city there was room for both gas and electricity. He wished the Gas Industry all possible success, because he thought it was for the good of progressive communities.

Sir BASIL M'FARLAND (a Director of the Derry Gas Light Company), who also acknowledged the toast, said it was a great pleasure to have the Irish Association there, and to know that Mr. Walmsley was the President. They were very proud of Mr. Walmsley, and of what he had done for the Derry Gas Company. Had the visit taken place ten or twelve years ago, he would not have been able to strike the cheerful note that he was doing that evening. In Mr. Smyth, as Chairman, and Mr. Walmsley, as Manager, they had two men who had transformed a tottering concern into a very flourishing business.

Mr. J. W. MCLUSKY submitted "The Ladies," which was responded to by Sir BASIL M'FARLAND.

Mr. GEORGE AIRTH proposed a hearty vote of thanks to Mr. Smyth. They were in Londonderry by the kindness of the Gas Company, and he asked them to drink to the continued prosperity of the undertaking. It was one of the oldest companies registered in Ireland, and had always been in the van of progress. The Chairman had a great reputation for hospitality, and the Board treated their Manager in a way which must be the envy of many.

Mr. R. H. SMYTH said the Directors were delighted to know that the Association appreciated their Manager, Mr. Walmsley. The Board were lucky to have secured him, and they intended to keep him.



THE NEW PRESIDENT.

Mr. L. G. YOUNG, of Carlow.

Alderman F. J. EDMONDS (Waterford) submitted the toast of "The President," who, he said, enjoyed to the full the esteem and affection of the members. He had rendered excellent ser-

vice to the Association during his period of office. Mrs. Walmsley had also endeared herself to all of them.

The PRESIDENT, responding, said he did not know of any manager who could be more fortunate than himself. His staff had worked hard, and he would like them to be associated with the vote.

The remaining toasts were: "The Press," which was proposed by Mr. H. W. SAVILLE (Wexford), and "The Artistes," submitted by Mr. A. S. BROOK (Lisburn).

THE EXCURSION.

The excursion on the Wednesday was to Rosapenna—a renowned beauty spot in the Donegal Highlands.

The party left the city shortly after eleven o'clock, and shortly after their arrival at the Rosapenna Hotel lunch was served, and this was followed by some competitions.

In the ladies' putting competition the winners were: 1, Mrs. Rooney, Drogheda; 2, Mrs. Walmsley, Derry; 3, Miss M'Intyre, Dungannon; 4, Miss B. Reid, Ballina. In a golf competition the winner was Mr. Robert Pollock. The prize for the best gross score went to Mr. Harrison, Armagh, while Mr. F. Law, Limerick, and Mr. W. Ainsworth, Bangor, tied for second place.

A handsome silver quaich, presented to the Association for annual competition by Mr. Grant, Peterborough, was awarded to Mr. Pollock, to whom it was handed by Mrs. Walmsley, who also presented the other prizes to the winners in the golf competition. Mr. Walmsley presented the prizes to the ladies.

Mr. Walmsley, on behalf of the Association, returned thanks to Mr. Grant for his kindness in presenting the quaich. He regretted that Mr. Grant himself was not able to be present.

Mr. S. Bennett, Edinburgh, on behalf of Mr. Grant, suitably acknowledged Mr. Walmsley's thanks.

Soil Corrosion Studies of the U.S. Bureau of Standards

By K. H. LOGAN, of the Bureau of Standards, Washington, D.C.

[A Contribution to the Distribution Conference of the American Gas Association, April, 1931]

The financial and moral support and encouragement which the Bureau of Standards has received for its study of soil corrosion has resulted in a growth of the work until at this time eight Bureau men and three research associates are engaged on problems related to pipeline corrosion and protection. While the necessity for a better understanding of the fundamental principles involved in corrosion is recognized, the efforts of the Bureau's soil corrosion section have been directed almost exclusively towards obtaining data of immediate practical use to the owners of underground pipe; it is believed that, although the corrosion problems are far from solved, it can be shown that large savings have already resulted from the facts brought to light, and that still greater economies will result from the work now in progress.

The organization about to lay a pipeline through new territory is faced by two corrosion problems—the location of the corrosive sections of the right-of-way, and the choice of the protection against corrosion.

IDENTIFYING CORROSIVE SOILS.

The work on methods of identifying corrosive soils has made considerable progress. The soil corrosion investigation started eight years ago, although incomplete, has furnished a large body of corrosion data. It has shown clearly that for at least the first eight years after a pipeline is laid the character of the soil rather than the type of ferrous pipe material controls the rate of corrosion. During this period one material or another shows some apparent superiority for local conditions, but the material which appears best under one condition may appear worst under another; and to date, with perhaps the exception of one set of specimens which should not have been submitted, the differences between the average performances of the several materials tested are small. It is possible, however, that, as corrosion products develop, the differences will increase; and for this reason the Bureau feels that it should not make comparisons of materials until the trend of the test has developed more positively. Using the soil corrosion data as a starting point, the research associate supplied by the Cast Iron Pipe Research Association is now co-operating with the Department of Agriculture in making a map of the United States which will show roughly the distribution of the corrosive soils. As but a third of the country has been surveyed with regard to soils, and as less than 50 of more than 400 recognized soil series have been studied with regard to corrosion, the map now in progress must be far from complete.

For a long time, therefore, it will be necessary to determine directly the corrosiveness of much of the soil through which a line is to pass if an intelligent decision as to the protection of the line is to be made.

ACIDITY OF THE SOIL.

During the last few years there have been developed at the Bureau of Standards and in the laboratories of oil and gas companies several methods of determining soil corrosivity and of making soil surveys. A number of these methods, such as those described by Putnam, Corfield, Legg, and Shepard, involve soil resistivity as one of the soil properties to be directly or indirectly measured. Since soil conductivity is electrolytic the determination of soluble salts in soils or soil solutions also has a correlation with soil resistivity. Whether electrical conductivity bears a fundamental relation to corrosivity or not, there can be no doubt that the two are closely associated in soils high in soluble salts, and that for such soils any method in which electrical resistivity is a major factor will serve roughly to indicate soil corrosivity. The choice between the methods will, therefore, be governed largely by the ease of application to the job at hand and by the importance from the point of view of predicting corrosivity of the factors by which the several methods differ. The Bureau of Standards soil corrosion data have been of considerable assistance in comparing methods of determining soil corrosivity, since they furnish data with which to check the results of the methods under investigation. It is very important that the methods should also be tried out simultaneously along several pipelines, the conditions of which can be determined by inspection. While most soils high in soluble salts or low in electrical resistivity are corrosive, it is known that severe pitting also occurs in some soils very low in salts, and consequently of high resistivity. A study of one such region by Holler and later by Denison indicated that in the area examined the total acidity of the soil was an indication of its corrosivity.

Laboratory studies made by Dr. Denison on the acid soils covered by the Bureau of Standards soil corrosion investigation indicate that a relation of acidity corrosivity exists for a large group of soils, but the scope of this method of identifying corrosive soils has not been as well defined as that of the methods involving electrical resistivity.

In many localities there is as much difference between the upper and lower horizons of a single soil as between two widely separated soils. The indications which an explorer will obtain will, therefore, often depend upon the depth at which he takes his soil sample or makes his test. It can be shown that in many places corrosion depends not only on the type of soil, but upon the depth at which the pipe is laid, the manner in which the trench is backfilled, and the apparatus or structures to which the line is connected. It seems possible that, if only certain sections of the line receive a protective coating, the corrosion of other parts of the line will also be affected.

It is probable that, on account of the difficulties cited above, it will seldom be practicable to predetermine accurately the corrosion to which a long pipeline will be subjected. Nevertheless, it is probable that even now a careful survey of a pipeline route for the purpose of determining the corrosiveness of the soils encountered is more than justified if the work is undertaken by someone familiar with soil corrosion problems.

The thing which raises the greatest doubt as to the advisability of a soil corrosion survey is the uncertainty as to the proper method for providing against the action of the corrosive soils after they have been located.

Such data as are available indicate that the conditions under which pipelines are frequently laid make it very difficult if not impossible properly to apply certain types of protective coatings. There is also evidence that some protective coatings which are satisfactory under some conditions fail when exposed to others. Unfortunately the necessary requirements for pipeline protection under various soil conditions are but partially understood. The maker of coatings has no sure way of determining whether

his new product will render better service, and the purchaser no rapid means of determining whether a proposed product will fulfil his requirements. Most data on field performance of coatings are indefinite as to the exact performance of the material reported upon and as to the soil conditions affecting the installation. On this account data on the failure or success of a coating in one part of the country are frequently of little real help in the protection of a new line.

The Bureau of Standards, through its own employees and through the research associates furnished by the American Gas Association and the American Petroleum Institute, is accumulating a large quantity of data in which the performance of protective coatings is related to soil conditions; but it will be several years before definite conclusions can be drawn concerning many of the materials studied.

In addition to field tests of proprietary coatings, an attempt is being made to determine the fundamental requirements for a satisfactory coating, and to develop methods for quickly determining whether a new coating is likely to be satisfactory.

REGISTER OF PATENTS

Chequer Blocks for Coke Ovens.—No. 351,365.

GAS CHAMBERS AND COKE OVENS, LTD., of Westminster.
(Communication from COLLIN & CO., of Dortmund.)

No. 31,095; Oct. 17, 1930.

This invention relates to chequer blocks for regenerative coke ovens. Hitherto, state the patentees, the regenerative chambers of regenerative coke ovens have been filled with refractory chequerwork. In cases where a special section of the regenerator is allotted to one or a few heating flues of each heating wall, the assembling and dismounting of the chequerwork presents difficulties owing to the brickwork which separates the individual sections of the regenerator, since these partitions are difficult to erect in the narrow regenerator chambers, and must be taken down and re-erected every time the chequerwork is renewed, or any other repairs have to be done on the regenerators. Moreover, the gaps formed in these thin partitions, through heat expansion, always give rise to leakages.

The present invention aims at obviating the foregoing effects by employing, as filling material for the regenerator chambers, refractory casings, which contain fillers and are disposed in rows in the regenerator chambers. The provision of the partitions is thus obviated, since the walls of the casings also form the partitions separating the sections. Consequently, the casings can be easily inserted and taken out. The casings can be disposed in the regenerator chambers with lateral and vertical play, so that they are able to expand independently of the oven brickwork, thus assuring staunchness, even when the casings are built up of parts.

Telescopic Gasholders.—No. 351,887.

MASCHINENFABRIK AUGSBURG-NURNBERG AKTIENGESELLSCHAFT, of Nürnberg.

No. 35,020; Nov. 20, 1930. Convention date, Dec. 24, 1929.

In the usual telescopic gasholders with water-cup seal the water container is mostly constructed as an annular vessel, in order to economize in the cost of foundations, &c. The internal space of this annular vessel would act as a clearance or dead space of the gasholder if it was not limited by a cover, as is mostly the case, so that the bell of the holder which constitutes the uppermost telescopic part rests in its lowest position on this cover. In this way the dead space in the interior of the holder is removed, but a new dead space is produced underneath the gas-space which normally is filled with air, and therefore it is occasionally used as a storage space and the like. This space, however, state the patentees, constitutes a great source of danger if gas penetrates into it through the cover. In order to avoid such danger a water layer has now and then been provided on the cover, which, however, is inconvenient.

In telescopic gasholders with sliding seal in which the uppermost telescopic member is the widest one and is in the form of a bell, an arrangement is provided according to the invention by which the dead space is avoided. With this object in view the bell cover is turned inwards to such an extent that in the position of rest—that is to say, when the uppermost telescopic part is in its lowest position—it almost touches the bottom of the holder. Any space in which the gas can accumulate is thereby avoided; should any gas escape upwards through the cover of the container into the turned-in part, this would not constitute a danger, since this space is connected with the outer atmosphere over its whole surface.

Gas Burners.—No. 352,121.

PAIGE, W. R., of Sheffield.

No. 12,234; April 17, 1930.

This invention relates to gas burners of the type comprising a mixing chamber, an air inlet pipe leading into the chamber, a gas inlet pipe alongside or around the air inlet pipe leading into the mixing chamber at a point behind the entry of the air, and a pipe or nozzle leading out of the chamber for conveying the mixture of air and gas for consumption. The air inlet pipe is adjustable in order that the point of entry of air may be variable.

The invention consists of providing in a gas burner of the above type an adjustable air inlet pipe capable of being projected into the outlet pipe or nozzle for discharging the air thereinto. The chamber is preferably, though not necessarily, of cylindrical form, with its axis arranged transverse to that of the air pipe; and the air preferably enters the chamber at a point beyond the centre. The air and gas inlet pipes may be arranged co-axial with the outlet pipe or nozzle for conveying the mixture of air and gas from the chamber.

Coke Oven Charging Cars.—No. 352,325.

GAS CHAMBERS AND COKE OVENS, LTD., of Westminster
(Assignees of COLLIN & CO., of Dortmund).

No. 28,750; Sept. 25, 1930. Convention date, Sept. 25, 1929.

To prevent the escape of coke oven gases into the atmosphere from the charging openings during charging, it has been proposed to fit a special gas exhaust conduit to the charging cars, and to connect this conduit through branch pipes with the hoods fitted to the discharge funnels of the car bunkers, which are adapted to be lowered on to the charging openings of the ovens. This arrangement is, however, relatively cumbersome and not fully efficient, since it is impossible to avoid a part of the gases still escaping into the atmosphere through the bunkers, which are open at their tops. This invention aims at simplifying this arrangement and at preventing any escape of gases into the atmosphere.

To this end the car, which has discharge funnels with extensions adapted to be lowered on to the oven charging openings, is made closeable at the top and is fitted with a pipe adapted to be placed in communication with suitable gas exhausting means, so that any gases escaping from the openings of the oven, on displacement of the charge, are exhausted through the bunkers, which are meanwhile closed at the top. A simplification in the operation can be achieved by coupling the actuating means of the upper or also the upper or lower bunker closures with the actuating means for the extensions of the discharging funnels which are adapted to be lowered on to the charging openings.

Gas Meters.—No. 352,616.

METROPOLITAN GAS METERS, LTD., and FORSTER, J. D., both of Nottingham.

No. 14,326; May 9, 1930.

This invention relates to coin-freed gas meters of the type provided with a mechanism which prevents coins of less than a predetermined diameter being inserted therein. To ensure facility of operation and freedom from jamming, the mechanism constructed in accordance with this invention is provided with an abutment member, normally arranged to obstruct the passage of a coin into the slot of the meter, and which essentially is pivotally mounted to the mechanism, as opposed to constructions in which the abutment member is slidably arranged, the pivotal mounting ensuring the advantages above stated.

The invention comprises a pivotally mounted abutment member arranged normally to obstruct the passage of a coin into the meter and means operatively connected to the member, and movable by an inserted coin, which ensures that the abutment member is moved out of the path of an inserted coin only when the latter is of a predetermined diameter.

Measuring Gas Flow through Mains. No. 352,664.

YOUNG, A. E., of Pittsburgh.

No. 16,493; May 28, 1930. Convention date, May 6, 1930.

This invention relates to orifice meters, and consists in apparatus which affords direct reading in units of volume of the

quantity of gas passed, with correction for variations in pressure. Under ordinary field conditions there may be such variation in the rate of flow of gas through the main as to necessitate change in the size of the orifice—to the end that, under all the range of rate of flow, there shall be differential pressure sufficient to operate the measuring apparatus with substantial accuracy.

The measuring apparatus comprises the combination with an orifice plate of variable aperture arranged in the main, of registering mechanism including a movable member equipped with a plurality of control transmission devices, one for each aperture position of the orifice plate, together with means for rendering one or other of the control devices effective at will.

Gasholders.—No. 352,883.

BAMAG-MEGUIN AKTIENGESELLSCHAFT, of Berlin.

No. 37,134; Dec. 9, 1930. Convention date, April 28, 1930.

In the case of gasholders of the plate type, it is known that the packing for the plate must always fit closely against the inner wall of the holder, state the patentees, to prevent the escape of gas. On this account, it was impossible with the known methods of packing the plate to ascertain the condition and extent of wear or the need of repair of the packing while the gasholder is in use. In such cases it was necessary either to dismount the packing and place the gasholder, or the gas space of the holder, in communication with the outside air, or else, with holders open at the top, to take out the plate from above, which, like the re-insertion of the plate, proved a difficult matter.

This invention is intended to render the packing surface of the plate accessible at all times without trouble and without placing the gas space in communication with the atmosphere or exposing the person occupied with the repair or inspection of the packing to the risk of becoming gassed.

This purpose is attained by providing round the lower part of the holder an opening (which may, if necessary, be interrupted by struts) adapted to be closed by cover plates and to be wholly or partially uncovered by taking-off the plates—an operation easy to effect. The aforesaid opening is located at the point where the packing of the plate is approximately in its lowest position. An immersion seal is also provided on the under side of the plate, owing to which the opening may be uncovered without any escape of gas.

Municipal Gas Undertakings' Results in 1930-31.

SALFORD.

The Gas Committee record that while the number of consumers continues to increase there has been a decrease in the sales of gas amounting to 3·37 p.ct. This decrease is due to two causes: (1) The great depression in trade and industry throughout the area of supply during the past year; and (2) the substitution of electricity for gas in main road lighting with the consequent loss in consumption of gas of about 30 million c.ft. per annum. The coal carbonized during the year amounted to 131,811 tons, as compared with 135,401 tons for the previous year. The quantity of gas made was 1,924,196,000 c.ft., as compared with 1,970,188,000 c.ft. for the previous year. The length of gas mains has been increased during the year from 352 miles 1118 yards to 358 miles 402 yards. The receipts from the sale of gas and rental of stoves show an increase as compared with last year of £12,124. There is a decrease in the receipts from the sale of residual products of £4973.

SITTINGBOURNE.

The annual report of the Sittingbourne and Milton Urban District Council Gas Undertaking for the year ended March 31 shows the income to be £14,088 and expenditure £10,862, leaving a gross profit of £3226. Gas sales increased by 10·5 p.ct., and it has been decided to reduce the price of gas by 1d. per therm from the next autumn meter readings.

WEST BROMWICH.

The report of the West Bromwich Town Council Gas Undertaking for the year ended March 31 shows that the gross profits for the year amounted to £18,093, compared with £15,219 in 1929-30—an increase of £2874. The net profits last year amounted to £4920, which is an increase of £2439 compared with the previous year's figures. The expenditure for 1930-31 was £106,586, as against £108,565 for 1929-30, a reduction of £1979, and the income last year was £111,507, an increase of £460 over the previous year's figure, which was £111,047. No less than 28,894 tons of coal were carbonized for gas-making purposes last year, which was 439 tons more than in the previous year. While the costs per 1000 c.ft. of gas sold showed a reduction of 1·06d.—the actual costs being 3s. 2·23d. last year, compared with 3s. 2·29d. in the previous year—the gross profit per 1000 c.ft. of gas sold was higher, being 9·22d., as against 7·64d. in 1929-30 (an increase of 1·58d.), and the net profit per 1000 c.ft. of gas sold was also higher by 1·27d., the figure being 2·51d., compared with 1·24d. in the previous year.

AUTOMATIC GAS HEATING

THE "EMPEROR"
Insulated and Mottle-Enamelled Boiler.)

THE "EMPEROR"
(Insulated and Cellulose-Enamelled Boiler.)

A Potterton Installation, with "Emperor" insulated Boiler and a thermal storage, yields an abundant supply of hot water with the greatest flexibility whenever the demand occurs, and at other times, both day and night, maintains the water at a high temperature with a consumption of 1·5 to 2·0 c.ft of gas per hour.

Potterton "EMPIRE" and "EMPEROR" Boilers are supplied on simple hire by the Gas Light & Coke Company.

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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The new Account opened on the Stock Exchange last week with quiet conditions in all sections. As the week progressed each day brought fresh rumours of the Government's intended policy on the question of economies, so that business became distinctly erratic. British Funds weakened as a consequence of fears that the Government contemplated a compulsory conversion scheme, but improved later on rumours of an emergency tariff on imports. Towards the close on Friday prices were again adversely affected by the news of a possible flat-rate tax on fixed-interest securities. On the whole, therefore, a very disturbed week.

Business in Gas stocks and shares was also on the quiet side, but prices remained steady. A further batch of ordinary stocks were marked down *ex* div., and among these Croydon sliding-scale, Newcastle £1 units, South Suburban, and Tottenham are attractive at current prices, not only from the point of view of permanent investments, for if the rumoured tax on fixed-interest securities becomes an established fact there is no doubt that a greater demand will be created for high-class ordinary issues, with a consequent appreciation in value. A recovery took place in Imperial Continental ordinary, and the price rose 5 points to 295-315; and, apart from *ex* div. reductions, the only fall was in Gas Light 4½ p.ct. debenture by 1 point to 96-99.

Among last week's dividend announcements were the following: Lea Bridge, 4¼ p.ct.; Sheffield, 3 p.ct. (against 3¼ p.ct.); Southampton, 2½ p.ct.; South Shields, 4½ p.ct. on the consolidated and new stocks and 2⅞ p.ct. on the ordinary stock; and Uxbridge, Maidenhead, and Wycombe, 3½ p.ct.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 17.

The prices of tar products, in fair quantities, are as follows:

Pitch is firm at 52s. 6d. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon, f.o.b., according to specification.

Pure toluole is 1s. 10d. to 1s. 11d. per gallon; pure benzole, about 1s. 4d. per gallon; 95/160 solvent naphtha, about 1s. 4d. per gallon; and pyridine bases, 3s. to 3s. 3d. per gallon.

Prices of spirits are *ex* sellers' works.

Tar Products in the Provinces.

Aug. 17.

The average prices of gas-works products during the week were: Gas-works tar, 20s. 6d. to 24s. 6d. Pitch—East Coast, 52s. 6d. to 53s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 52s. 6d. to 53s. 6d. f.o.b.* Toluole, naked, North, 1s. 6½d. to 1s. 6¾d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 10½d. to 11d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 1¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid, 60's, 1s. 3d. to 1s. 4d. Naphthalene, £9 to £10. Salts, 50s. to 70s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Aug.* 15.

Throughput of refined tar is well maintained, and quotations are firm. Other products remain slow, and creosote oil, if anything, is somewhat easier.

Pitch.—With supplies low, value is nominal at about 40s. to 42s. 6d. per ton f.o.b. Glasgow for prompt. Forward price is some shillings higher.

Refined tar to Ministry of Transport Specification is in great demand for prompt delivery, and quotations are firm at 2½d. to 2⅝d. per gallon f.o.r. makers' works in buyers' packages.

Creosote oil.—Buying has eased off somewhat and prices are irregular. B.E.S.A. Specification is 2⅝d. to 3d. per gallon; low gravity, 3½d. to 3½d. per gallon; and neutral oil, 3¼d. to 3½d. per gallon—all f.o.r. in bulk.

Cresylic.—Few orders are on hand, and quotations are unstable. Pale, 97/99 p.ct., is 1s. 3d. to 1s. 4d. per gallon; dark, 97/99 p.ct., 1s. 2d. to 1s. 3d. per gallon; and pale, 99/100 p.ct., 1s. 5d. to 1s. 6d. per gallon—all *ex* works.

Crude naphtha.—Supplies are not too plentiful, and value is steady at 4¼d. to 4⅜d. per gallon according to quality.

Solvent naphtha.—The market remains dull; 90/160 being 1s. 2d. to 1s. 3d. per gallon, and 90/190 11d. to 1s. per gallon.

Motor benzole.—Value in this area may be taken at 1s. 2d. to 1s. 3d. per gallon *ex* works.

Pyridines.—90/160 grade is 2s. 9d. to 3s. per gallon, and 90/140 grade 3s. to 3s. 3d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole:

	s.	d.		s.	d.	
Crude benzole	0	5½	to 0	6½	per gallon at works	
Motor ,,	1	0	,, 1	1	,,	,,
Pure ,,	1	4	,, 1	5	,,	,,

Trade Notes.

Great Western Railway Favour "Nust."

The Great Western Railway have contracted with the Nor-Rust Liquid Lead Company, Ltd., for the coating of approximately 200,000 ft. of steel with "Nust" at the docks at Fowey.

Carbonizing Plant Extensions at Pontypool.

The Pontypool Gas and Water Company have placed an order with Messrs. Robert Dempster & Sons, Ltd., of Elland, for an interesting modernized bench of horizontals, the salient factors of which are: Patent flat bench-cover, which renders main-arches unnecessary. The beds are "throughs," sixes in three tiers of two, and (there being no main-arch) are designed to be easily convertible to eights in four tiers of two, which gives the advantage that the unit grows with the growing gas-works. The regenerators are two-ply tubular, thereby doubly safeguarding the chief element of efficiency—viz., air-tightness—and gaining the advantage that the thin divide can be pointed on both the secondary air and waste heat sides. The producers have the non-clinkering screen-bar grates of relatively large area, to reduce clinker formation. "Dempster-Toogood" patent descension (scrubber) offtake pipes overcome pipe-augering and give a level-gauge condition to all retorts; thus the thermal yields are both qualitatively and quantitatively maintained at the highest.

New Capital Issues.

Stourport Gas Company.—The issue of £3000 new ordinary stock by the Stourport Gas Company has been largely over-subscribed. Letters of allotment and regret have been posted to the applicants.

Contracts Advertised To-Day.

Demolition.

The Warrington Corporation Gas Department invite tenders for the demolition of a retort-house and gasholder columns. [Advert. on p. 442.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 14.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C. ...	78—83	...	...
522,992	"	"	4	4	Do. 4 p.c. Pref. ...	75—80	...	...
1,551,868	"	Apl. 9	7⅞	7⅞	Alliance & Dublin Ord. ...	102—107	...	...
374,000	"	July 9	4	4	Do. 4 p.c. Deb. ...	71—76	...	...
522,655	"	Mar. 5	7	7	Barnet Ord. 7 p.c.	124—129	...	126½—127
300,000	1	Apl. 23	1/4⅛	1/9⅛	Bombay, Ltd.	16/6—18/6	...	...
174,500	10	Aug. 10	9	9	Bournemouth 5 p.c. ...	14⅛—15⅝†	−⅜	...
500,050	10	"	7	7	Do. B 7 p.c. ...	12⅛—13†	−¼	12⅝
439,160	10	"	6	6	Do. Pref. 6 p.c. ...	11—11½†	−¼	...
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb. ...	60—63	...	...
162,025	"	"	4	4	Do. 4 p.c. Deb. ...	80—83	...	...
357,900	"	Mar. 19	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	...	...
371,880	"	"	6⅝	6⅝	Do. 5 p.c. Con.	105—108	...	...
1,287,500	"	July 23	5	5	Bristol 5 p.c. max.	96—97a	...	...
120,420	"	June 25	4	4	Do. 1st 4 p.c. Deb. ...	78—80a	...	...
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	78—80a	...	...
328,790	"	"	5	5	Do. 5 p.c. Deb.	98—99a	...	...
865,000	"	Apl. 9	7	8	British Ord.	110—115	...	113⅝—115
100,000	"	June 25	7	7	Do. 7 p.c. Pref.	110—115	...	...
120,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	77—80	...	78
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	97—100	...	...
160,000	"	June 25	5	5	Cambridge 5 p.c. Deb. ...	98—101	...	...
100,000	10	May 21	6	8	Cape Town, Ltd.	9—10	...	...
100,000	10	May 7	4½	4½	Do. 4½ p.c. Pref. ...	6½—7½	...	...
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb. ...	72—77	...	...
636,860	"	July 23	6	6	Cardiff Con. Ord.	95—98	...	...
237,860	"	June 25	—	2½	Do. 5 p.c. Red. Deb.	99—102	...	...
157,150	"	Aug. 10	6½	5	Chester 5 p.c. Ord.	83—88b*	−2	...
98,936	1	May 7	†2/-	†2/-	Colombo, Ltd. Ord.... ...	28/—33/-	...	...
24,500	1	"	1/4½	1/4½	Do. 7 p.c. Pref.	17/6—19/6	...	...
609,204	1	Apl. 9	1/4½	15'27d	Colonial Gas Assn. Ltd. Ord.	16/—18/-	...	...
296,053	1	"	1/7½	17'67d	Do. 8 p.c. Pref.	17/6—19/6	...	...
2,073,280	Stk.	July 23	6	6	Commercial Ord.	92—95	...	93½—94½
475,000	"	June 11	3	3	Do. 3 p.c. Deb. ...	59—62	...	...
787,560	"	Aug. 10	7	7	Croydon sliding scale ...	107—110*	−3	108½
453,100	"	"	5	5	Do. max. div. ...	81—84*	−2	82½—83½
542,270	"	Mar. 5	7	10	Derby Con.	122—125e	...	...
55,000	"	June 25	4	4	Do. Deb.	65—70e	...	...
209,000	"	Mar. 5	5	5	East Hull Ord. 5 p.c. ...	72—75	...	...
1,002,180	"	Mar. 19	†4	†6½	European, Ltd.	80—90	...	80—87½
18,953,033	"	July 23	5½	5½	Gas Light & Coke 4 p.c. Ord.	18/6—19/6f	...	19/1½—19/6
2,600,000	"	"	3½	3½	Do. 3½ p.c. max.	65—68	...	67
4,294,691	"	"	4	4	Do. 4 p.c. Con. Pref. ...	78—81	...	79—81
5,694,095	"	June 11	3	3	Do. 3 p.c. Con. Deb. ...	61—64	...	61—62½
3,642,770	"	"	5	5	Do. 5 p.c. Red. Deb. ...	103—106	+1	105—105½
2,500,000	"	"	—	—	Do. 4½ p.c. Red. Deb. ...	96—99	−1	96½—98½
161,480	"	Mar. 5	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	"	Mar. 19	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	...	...
258,740	"	"	5½	5½	Do. 3½ p.c. Conv.	82—85	...	83—84
70,000	10	Oct. 9	§	10	Hongkong & China, Ltd. ...	13—14	...	...
213,200	Stk.	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	89—92*	−2	...
2,800,000	"	May 21	15	25	Imperial Continental Cap.	295—315	+5	290—309
223,130	"	Aug. 10	3½	3½	Do. 3½ p.c. Red. Deb.	76—81*	−2	...
235,242	"	Aug. 10	8½	8½	Lea Bridge 5 p.c. Ord. ...	124—127*	−3	124½
2,145,907	"	Feb. 19	6	6	Liverpool 5 p.c. Ord. ...	99—100b	...	...
306,083	"	July 15	4	4	Do. 4 p.c. Deb. ...	79—81b	...	...
165,786	"	Feb. 19	9	9	Maidstone 5 p.c. Cap. ...	130—135	...	...
63,480	"	June 25	3	3	Do. 3 p.c. Deb. ...	57—60	...	...
75,000	5	June 11	†10	†10	Malta & Mediterranean ...	6¾—7¼	...	...
392,000	—	Apl. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	80—85	...	...
675,000	Stk.	May 21	†6	†6	Montevideo, Ltd.	80—90	...	...
2,061,315	"	Aug. 10	5½	5	Newcastle & Gateshead Con.	16/—16/9d/*	−1/1½	...
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	74—75d*	−1½	...
691,705	"	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	69—71d	...	...
277,285	"	May 7	5	5	Do. 5 p.c. Red. Deb.	98—100d	...	...
199,940	"	Mar. 5	7½	7½	North Middlesex 6 p.c. Con.	115—120	...	...
396,160	"	Aug. 10	5	5	Northampton 5 p.c. max. ...	74—79*	...	...
300,000	"	Apl. 23	9	7	Oriental, Ltd.	93—103	...	93—94
60,000	5	13 May, '15	—	—	Ottoman	0—⅝	...	...
205,162	Stk.	June 25	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	...
424,416	"	Feb. 19	8	8	Portsm'th Con.Stk. 4 p.c.Std.	122—127	...	...
241,446	"	"	5	5	Do. 5 p.c. max. ...	78—81	...	...
686,312	"	July 23	4	4	Primitiva 4 p.c. Rd. Db. 1911	83—86	...	...
389,813	"	June 25	4	4	Do. 4 p.c. Cons. Deb.	84—87	...	84½
150,000	10	Apl. 9	6	6	San Paulo 6 p.c. Pref. ...	8—8½	...	...
1,736,968	Stk.	Mar. 19	6½	6½	Sheffield Cons.	105—107e	...	...
95,000	"	July 9	4	4	Do. 4 p.c. Deb.	79—81e	...	...
90,000	10	June 11	15	15	South African	3½—5½	...	...
6,709,895	Stk.	July 23	7½	5	South Met. Ord.	101½—103½	...	101¾—103½
1,136,812	"	"	6	6	Do. 6 p.c. Irred. Pf.	112—115	...	...
1,895,445	"	July 9	3	3	Do. 3 p.c. Deb. ...	60—63	...	60½—62½
734,000	"	Mar. 5	6½	6½	Do. 6½ p.c. Red. Db.	98—100	...	...
1,000,000	"	July 23	4	5	Do. 5 p.c. Red. Deb.	101—104	...	103
91,500	"	Aug. 10	8½	8½	South Shields Con.	110—112d*	−3	...
1,543,795	"	Aug. 10	6½	6½	South Suburban Ord. 5 p.c.	101—104*	−2	102¾—104
668,837	"	June 25	5	5	Do. 5 p.c. Deb.	100—103	...	...
647,740	"	Feb. 19	5	5	Southampt'n Ord. 5 p.c. max.	78—81	...	...
121,275	"	June 25	4	4	Do. 4 p.c. Deb.	77—80	...	...
179,014	"	Aug. 10	8	8	Sutton Ord.	115—125*	−5	...
94,500	"	June 25	5	5	Do. 5 p.c. Deb.	96—99	...	...
250,000	"	Mar. 5	7	7	Swansea 7 p.c. Red. Pref. ...	98—101	...	...
200,000	"	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	"	Aug. 10	6⅝	6⅝	Tottenham District Ord. ...	102—105*	−1½	...
150,000	"	"	5½	5½	Do. 5½ p.c. Pref. ...	99—102*	−2	...
199,005	"	June 11	4	4	Do. 4 p.c. Deb.	78—81	...	...
85,701	"	Mar. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	74—79	...	...
310,694	"	Mar. 5	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	...	...
88,830	"	"	5	5	Do. 5 p.c. Pref. ...	90—95	...	...
1,322,220	"	July 9	7	7	Wandsworth, Wimbledon, and Epsom Cons. ...	111—114	...	...
426,000	"	"	5	5	Do. 5 p.c. Pref.	97—100	...	...
1,013,464	"	June 25	5	5	Do. 5 p.c. Deb.	100—103	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.et. p.a. less tax and less tax on interim dividend.

(This announcement is inserted gratuitously.)

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With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated, and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

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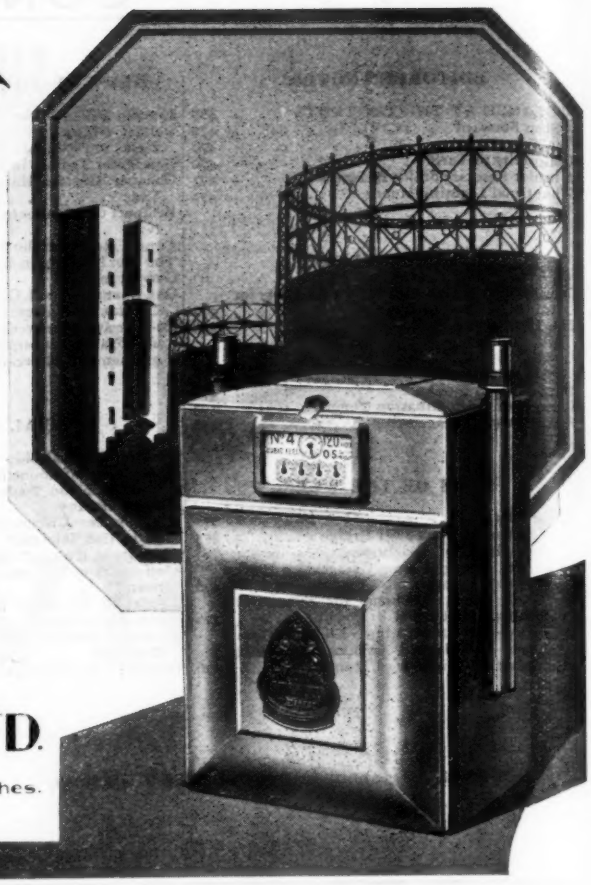

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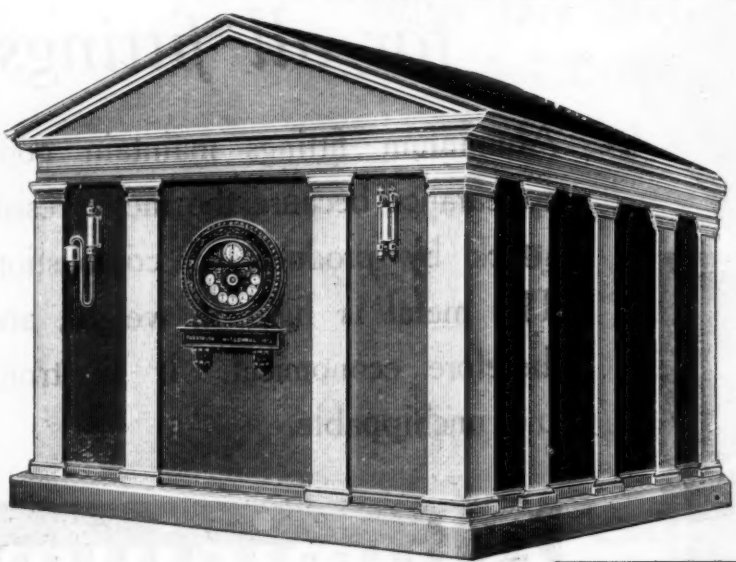

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